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Cover photograph: Wm. Hopkins

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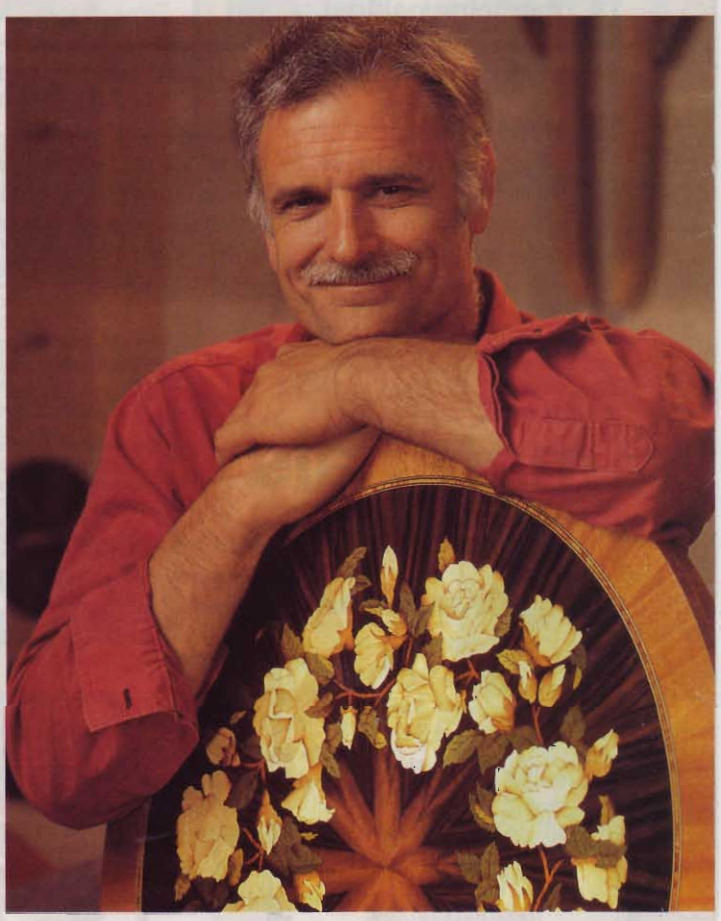

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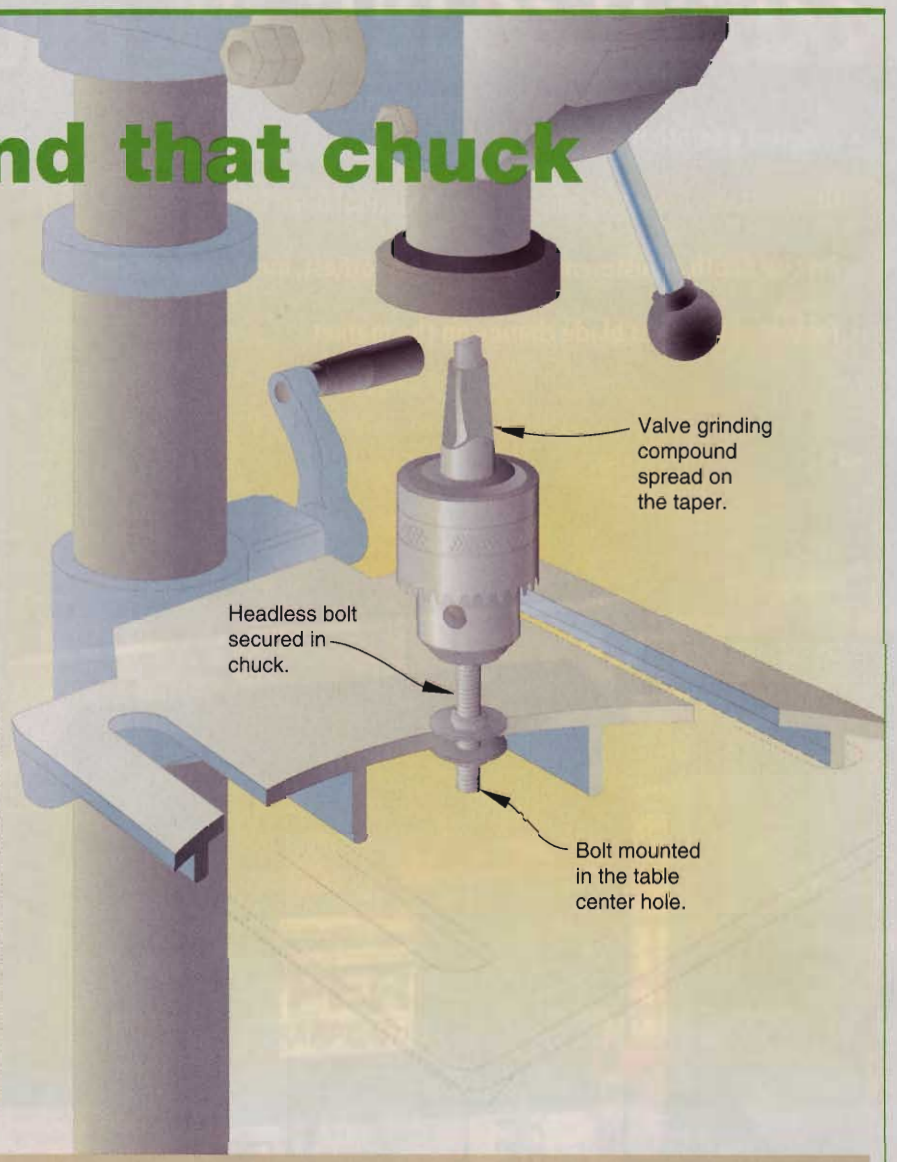
This issue's cover wood grain: elm burl

Don't pound that chuck

I cringed when reading the remedy for a poor-fitting drill-press Morse taper in Hot Off the Internet in Issue 124. Pounding the poor chuck into submission is not the answer.

Get a long bolt that is the largest diameter your chuck will accept, and cut off the head. Clamp it in the chuck, thread on a nut, and slip on a washer. Insert the bolt in the center hole of the drill-press table, add another washer and nut, and fasten the chuck loosely to the table, as shown in the drawing. Run the drill-press quill down onto the chuck's taper to center it and tighten the nuts. Spread some automotive valve grinding compound on the chuck taper. Set your drill press on its lowest speed, switch it on, and run the quill down onto the chuck taper. Apply light downward pressure, and you'll soon have a tight-fitting chuck that only comes off when you want it to. Wipe off the compound, and seat the taper with a couple of light raps with a dead-blow hammer.

—John Graber, Jacksonville, Fla.



Smoke detectors cannot be switched

While reading the tips section in Issue 126, I came across an item that made my jaw drop to the floor. The tip suggested installing a smoke detector on a switched circuit so false alarms can be avoided by turning the detector off while the shop is in use.

As a project manager of a fire alarm company, I design and install alarms for commercial and residential applications. My work is governed by a multitude of codes, among them the National Electric Code (NEC). NEC states that smoke detectors shall be on a dedicated, unswitched circuit.

—Vince Perregrino, Spring, Texas

As a 25-year veteran of the fire alarm industry, I need to respond to the false alarm prevention tip in Issue 126. I don't argue with the idea of avoiding false alarms, but interrupting power to a fire detection device is not the way to do it.

Most readily-available smoke detectors are of the photoelectric or ionization type. These are easily defeated, and even disabled by a dusty environment. Many are impossible to clean properly. In this situation, alarm professionals use heat detectors instead of smoke detectors. In a woodworking shop where a fire is likely to generate lots of heat rapidly, a combination rate-of-rise and fixed-temperature detector is a good choice. These units are sealed against dust and dirt, so simple exterior cleaning is all that is necessary.

—Scott McElroy, Lakewood, Ohio

Continued on page 10

Holding down small carving blanks

An article in Issue 123 shows how to carve a shell-shaped furniture pull. The bandsawn shape is glued to a scrap board with a layer of paper between the blank and the board.

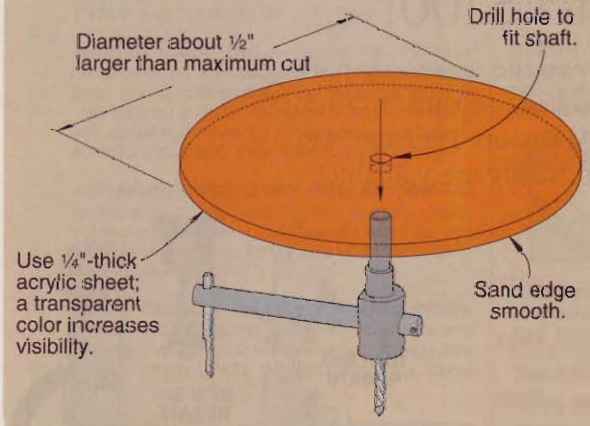
I would mount the workpiece by drilling through the board into the back of the blank, and screwing it in place. This would be the same way that the finished piece is mounted to the drawer, and eliminates having to clean paper and glue from the back of the completed shell.

—Peter Stari, Parma, Ohio

Your method probably would work in this case, Peter, because the shell is a fairly simple shape, and the carving depth would be easy to gauge. Even so, use brass screws instead of steel ones. But many carvers would not feel comfortable working away at a small block of wood, knowing that there are a couple pieces of metal buried in there. Better to complete the carving, then measure the thickness and drill pilot holes for the appropriate screw length.

Safety and the circle cutter

As a junior high school industrial technology teacher, I have used your tips many times in assisting my students to design and construct our projects safely. In Issue 122 you list precautions to take while using oversize cutters on the drill press. I would like to add to that list a precaution when using an adjustable circle cutter. Anyone who has used one realizes that while the cutter is spinning, the cutter arm is difficult to see. And the protruding butt end of the cutter can easily catch your hand.



I recommend adding a ¼" acrylic safety shield to the cutter, as shown in the drawing. Installed over the shaft of the circle cutter before it is chucked into the drill press, the shield lets you see exactly where the outer limit of the cutter is. Be sure to sand the edges of the disc smooth to avoid getting cut by it.

—Joe Haworth, Federal Way, Wash.

Finding a circle's center in three steps

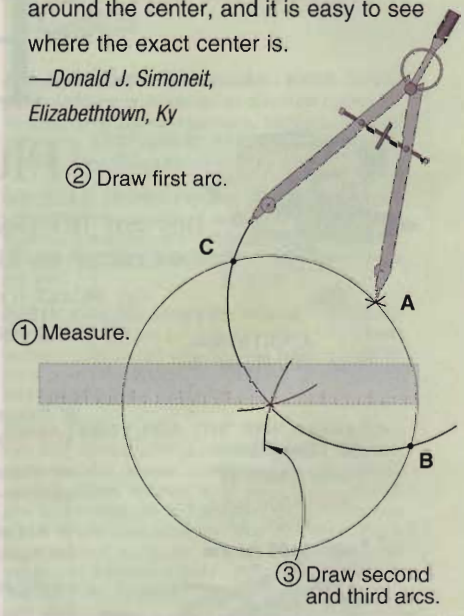
"What Woodworkers Need To Know" in Issue 124 shows one method for finding the center of a circle. Here is my three-step method that uses a compass.

1 Measure the diameter of the circle as accurately as you can. Divide this measurement by two to find the radius. Set your compass to the radius.

2 Pick any point A on the circle, and draw an arc that intersects the circle at points B and C, as shown in the illustration *below*.

3 Draw arcs centered at points B and C that intersect the first arc as shown. If your measurement of the circle was accurate, the three arcs intersect at the center of the circle. If you were off a little, the arcs define a small area around the center, and it is easy to see where the exact center is.

—Donald J. Simoneit, Elizabethtown, Ky



Attention would be wood collectors

The article "What Wood Is That?" in Issue 122 mentions the idea of starting a sample collection to aid in wood identification. You suggest using a sample size of 3×5". I would like to remind readers that the International Wood Collectors' Society (IWCS) has a worldwide standard sample size of ½×3×6". Using this size allows you to buy, sell, and trade wood samples with other IWCS members, giving you access to species far beyond the scope of your personal travel.

—Ron Odegaard, Appleton, Wis.

Write Us!

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We select and publish only letters of the greatest benefit to our readers.

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Now's the time to build outdoor projects

Although the weather right now might not be conducive to enjoying a cold iced tea while lounging outside in a comfy Adirondack chair, you should start thinking about building that deck chair, patio planter, arbor, or picnic table. Summer will be here before you know it.

To get a jump on things, check out the vast online selection of quality plans for outdoor projects. There's no easier or faster way to order. Just follow the navigation *below*. You'll find over 125 plans that download directly to your computer, as well as 100+ paper plans that ship to you within 24 hours of your order.

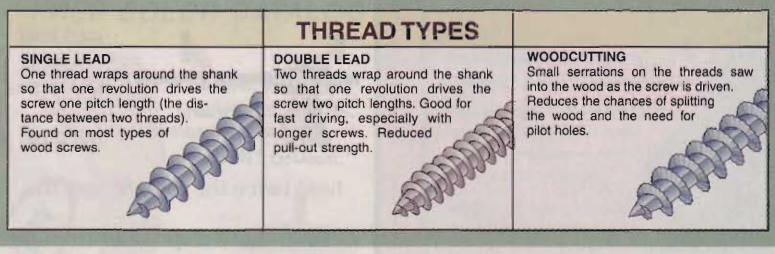
Go to woodstore.woodmall.com, then click on either downloadable plans or WOOD PLANS®. Go to outdoor furniture and accessories *or* outdoor projects.

5 free charts that belong in your shop

Over the years we've published a lot of valuable shop reference charts in *WOOD®* magazine. If you don't have these, here's your chance to print up some for yourself. You'll find them to be one of the most useful "tools" in your shop.

Just follow the simple surfing directions *below*. You'll find charts on woodworking glue and decimal/millimeter equivalents on the site. You also can download extensive charts on drill-press speed guidelines, wood screws (see part of the chart *below*), and lumber. We refer to them when building projects all of the time!

Go to woodonline.com, click on WOOD MAGAZINE, then go to FREE Charts.



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skin saver

unique blade brake stops the cutting before you know you're nicked

The story usually begins this way: "I was making the last cut of the day, and I guess I must have been thinking about something else..." and ends with the storyteller showing a stub, scar, or gauze bandage. During 1999, about 33,000 people visited emergency rooms with tablesaw-related injuries.

But a former patent attorney in Oregon hopes to drastically reduce that number. Stephen Gass invented the SawStop tablesaw-blade brake, and he hopes it will be to woodworking power tools what the airbag is to automobiles.

Braking news

The drawing on *page 16* shows you the nuts-and-bolts details of how Gass's safety system works. Simply speaking, if your skin makes contact with any part of the sawblade, SawStop slams on the brakes, cutting power to the motor and halting the blade in less than a quarter of a turn. The whole process, from skin detection to blade stoppage, takes between 2 and 5 milliseconds. By comparison, the best human reaction time is about 100 milliseconds—twenty times slower than SawStop.

To demonstrate SawStop, Gass uses an ordinary all-meat wiener to simulate a human finger. He slices into a sheet of plywood, holding the wiener directly in the path of the blade. Suddenly, with a loud BANG!, the blade stops and drops below the tabletop. The sausage skin is barely nicked; not even enough to pierce it.

So it works with hot dogs, but how do you know it'll work with *human* contact? "Well, we had to be sure," Gass says, showing a finger that appears to have a paper cut at its tip, "so I stuck my finger into the blade. Thankfully, it worked like a champ."

Naturally, he didn't just jam his finger into the teeth for the in-the-flesh test. But Gass calculates that, in a real-life situation at a "reasonable" feed rate, the blade might cut 1/32" into your finger before stopping. "About the only way to get a serious injury using SawStop is to slam your hand down on the spinning blade," he says. "Even in that case, you might lose one finger instead of four."

After the hot-dog demonstration, Gass uses a wood block and hammer to tap the brake pawl off the blade, pops out the spent brake cartridge, and replaces it with a fresh one. He then lifts the arbor block back into place, and in minutes he has the saw up and running again.

Kudos and cautiousness

None of the tablesaw manufacturers we talked to for this article would go on the record with their thoughts about SawStop, and according to Gass, none have yet committed to making the safety device standard equipment on their saws. While praising his efforts, the manufacturers we talked to cited several concerns.

First, SawStop will not work with the current design of tablesaws, which has remained essentially unchanged for 50 years or more. (Gass demonstrates the

Continued on page 16

mechanism on a modified Jet contractor-style saw.) To incorporate the device would require a major under-the-hood overhaul.

And, they say, most consumers won't be willing to pay the extra money for it. However, all conceded that if one manufacturer takes the leap and makes SawStop an integral part of their saws, they'll likely be forced to follow suit. Gass expects that SawStop would add only about $50 to the price of a contractor-style tablesaw; manufacturers' estimates are much higher—$150 or so.

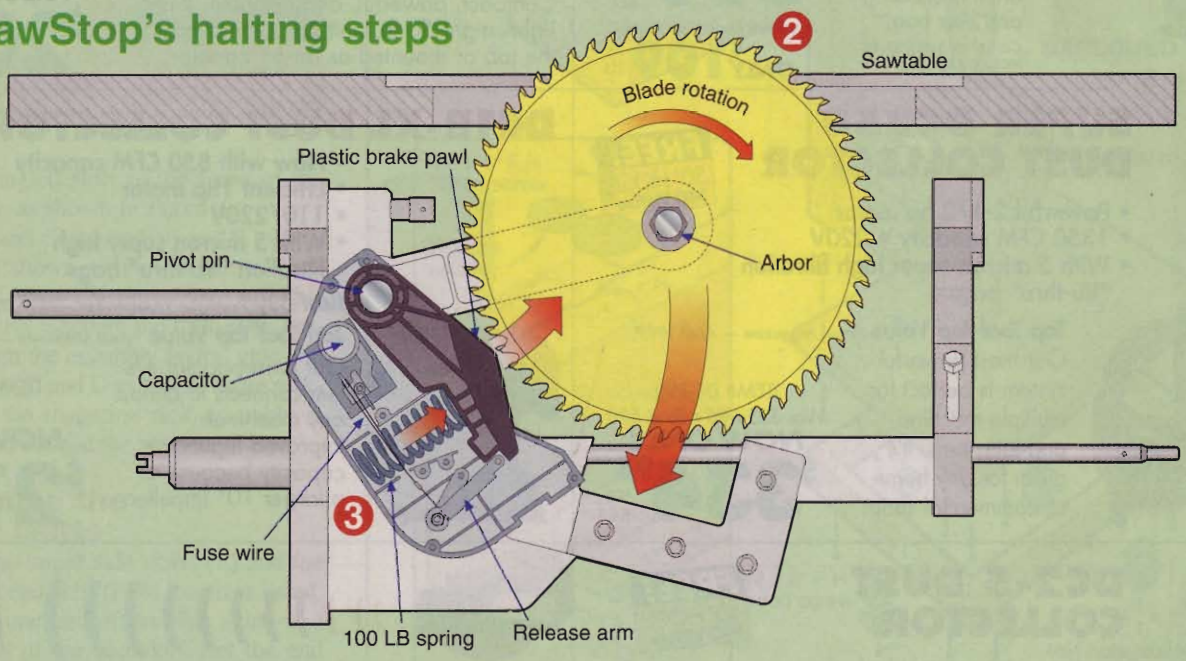
With the challenge of perfecting the skin-sensing circuitry under his belt, Gass says the blade-braking technology can be applied to a number of power tools. In fact, SawStops for mitersaws and portable circular saws are already in the works and could well hit the market at about the same time as the tablesaw version, which is probably at least a year away.

See SawStop in action

If you'd like to view a super slow-motion video of SawStop bringing a blade to a halt, visit the Editorial Extras page of WOOD ONLINE® at www.woodonline.com/editorial/131sawstop.

Written by **Dave Campbell**
Illustrations: **Kim Downing**
Photograph: **Baldwin Photography**

SawStop's halting steps



Step One: As you switch on the saw, SawStop performs a quick self-test to make sure the system is operational. If the circuitry detects a failure, the motor will not start. If all is well, SawStop induces a low-voltage current on the blade and arbor, which are insulated from the rest of the saw by plastic bushings placed between the arbor and the arbor bearings. Circuitry mounted in the arbor block constantly monitors the induced voltage on the blade as it turns.

Step Two: Skin contact with the blade while it's spinning (under power or coasting down) causes the voltage on the blade to drop suddenly. When the SawStop circuitry sees a sudden voltage drop, it triggers the braking system. (Even green and/or wet wood does not conduct electricity as well as the human body. Therefore, the voltage drops little when cutting wood or plastic.)

Step Three: The braking system is housed in a replaceable cartridge positioned about ⅛" from the edge of the blade. A small fuse wire holds back the plastic brake pawl against the force of a 100-pound spring. When the braking system is triggered, a capacitor dumps its charge on the fuse, causing it to burn and allowing the spring to forcefully pivot the brake pawl into the teeth of the blade. The blade stops in a quarter-turn or less and, in most cases, is not damaged by the brake.

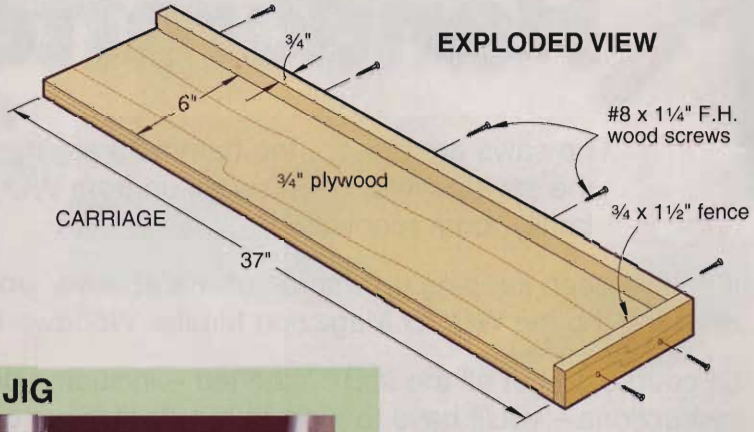
Step Four: The torque of the sudden stop pulls the blade downward into the saw where a special elevation worm gear releases, allowing the arbor block and blade to drop harmlessly out of the way. After firing, replace the brake cartridge. (A new cartridge will sell for $20–40.) Lift the arbor block until the worm gear snaps back into place on the height-adjustment crank, and the system is once again ready to go.

step-and-repeat jig

spacers let you locate drilling positions

Having worked for more than forty years as a printer, *WOOD*® reader Bill Lacey is familiar with the process called "step and repeat." In printing, images, for instance a business card, are reproduced in rows and columns to fill a full sheet of paper.

Because he builds toys in small batches and needs to quickly and accurately repeat drilling operations, Bill adapted this idea to his woodworking.

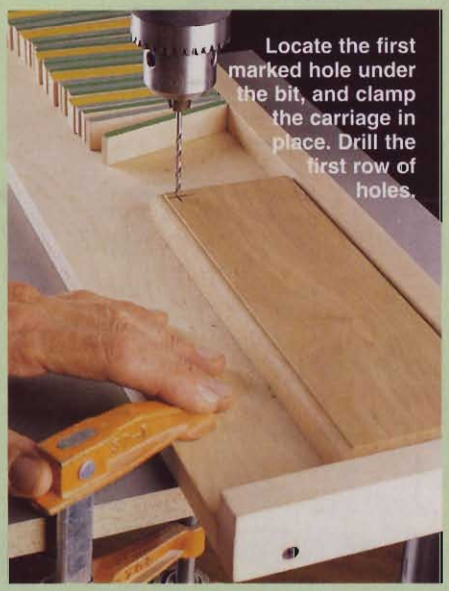


The jig has two components. The carriage, equipped with rear and end fences. And the spacers, which allow you to position your workpiece.

Build the carriage as shown in the drawing. The size of the carriage can vary according to the size of pieces you are drilling and the maximum reach of your drill press. You can cut spacers to standard widths ahead of time, or custom-make spacers for each different job. Bill took the first approach, cutting spacers in widths from ⅛" to 1" in 1/16" increments, and from 1" to 6" in 1" increments. Cut all the spacers of the same width at the same time to ensure uniformity.

The photographs demonstrate using the jig to drill holes in a cribbage board. We positioned the workpiece by inserting spacers between the fences and the piece to progressively move it away from the end fence and out from the rear fence. The green spacers move the piece in ⅛" increments; the yellow spacers in ½" increments.

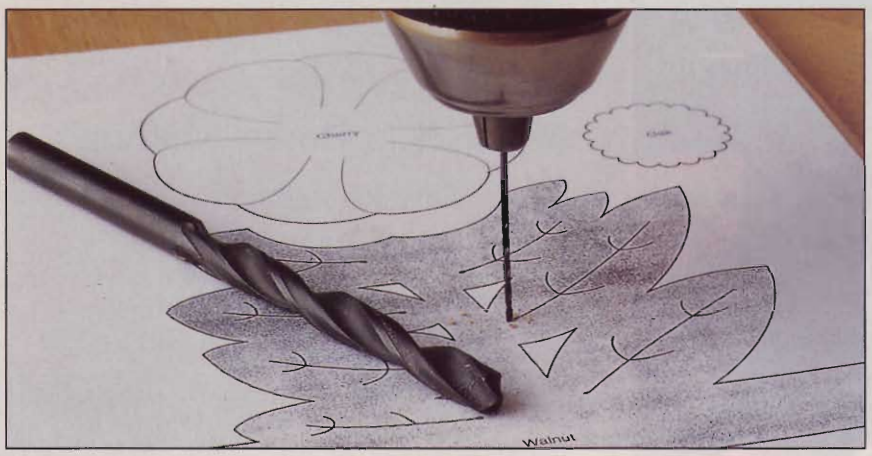
HOW TO USE THE JIG



Project Design: **Bill Lacey, Vancouver, B.C.**
Photographs: **Baldwin Photography**
Illustrations: **Roxanne LeMoine; Lorna Johnson**

Answers to woodworking questions gathered from your letters and e-mails, and our WOOD Online® discussion groups.

Pilot holes for scrollsaw projects



Q I do a lot of scrollsawing in ¾" oak, and some of the plans call for veining. A pilot hole is needed to insert the blade, which ruins the appearance of the vein. Can you help me out?

—Bob Pyke, Carlsbad, N.M.

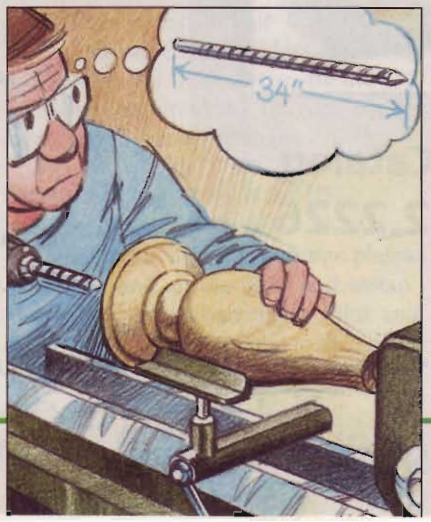
A No matter how small the blade, Bob, there's a drill bit just as small. Sloan's Woodshop (888/615-9663) offers a 20-piece set of bits, ranging from .0135" to .039", for $9.95, plus shipping and handling. Their "precision pin chuck," also priced at $9.95, will hold these tiny units securely in your drill chuck. If you know which sizes you're going to use and replace the most—and the tiny ones will break—you can buy specific bits by the dozen from Sloan's.

Drilling long holes

Q I'm turning lamp bases that need a 34" long, straight hole through their centers. The longest drill bit that I can find is too short, forcing me to try to make the two ends meet in the middle. That's tough to do. Do you know of a source for 36"-long bits, preferably screw-point and self-clearing?

—Stephen McConnel, Townshend, Vt.

A Steve, we stopped at an electricians' supply outlet and found 36" rigid extensions and flexible screw-point bits up to 72" long, but they're not likely to provide the accuracy you need. And the longest lamp auger carried by Craft Supplies USA (800/551-8876) measures 30", including the wooden handle. So, if you can live with the resulting glue line, your best bet is to rip your stock lengthwise, saw or rout a groove down the middle, glue it back together, and then turn it.



"Pop!" goes the dust canister

Q I have a Porter-Cable random-orbit sander, model 333, and the dust canister won't stay on. What's the solution?

—Roger Heid, Iron Mountain, Mich.

A Roger, Porter-Cable has made some changes to address this very problem. The company modified the O-rings that hold the dust canister on the housing, switching to a material that's supposed to be less affected by heat and cold, and they also stopped lubricating the rings.

To get replacement rings for your sander, contact your nearest service center or call the manufacturer at 888/848-5175 to find out where the rings are available. You can get new rings free if your old rings failed because of temperature extremes.

It's the second time Porter-Cable has beefed up the attachment system. The original version of this sander had one rubber O-ring on the dust collection housing; in 1996, engineers added a second ring.

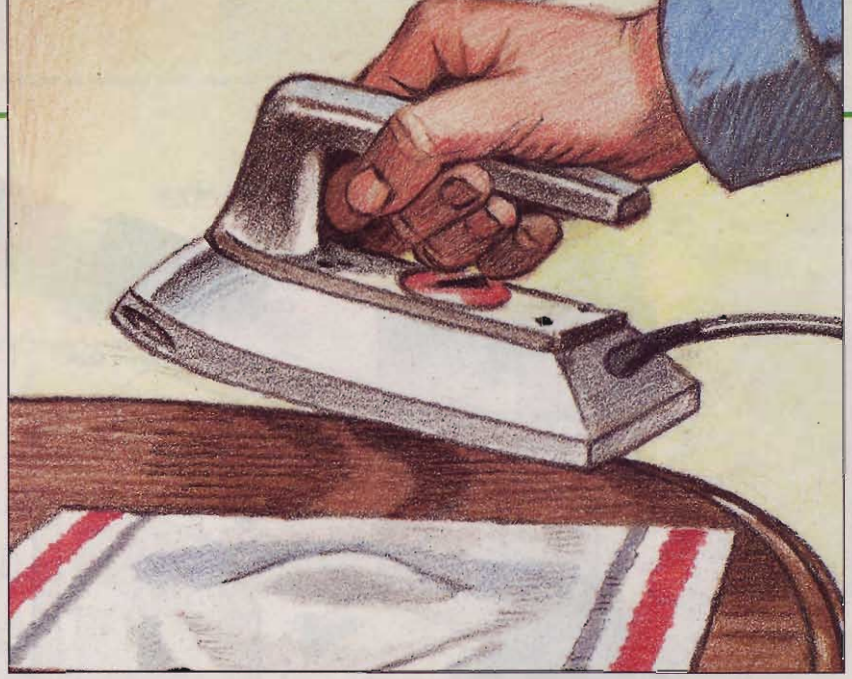
DeWalt was having the same problem with the plastic canisters on its random-orbit sanders. So, two or three years ago, the company switched to a spring-loaded cloth bag and a twist-on mount that clicks into place.

Continued on page 22

Iron out your bubble trouble

Q The veneer on our dining room table has raised up in a bubble about the size of a half dollar. It's not near a seam or the edge of the table. How can I repair it?

—Paul Zimmerman, Talbott, Tenn.



A If you're lucky, Paul, you can fix it with an electric iron. Put a kitchen towel over the bubble to protect the finish, set your iron to medium heat, and press down on the bubble for a few minutes. After it's flat, stack some books on top and leave them overnight.

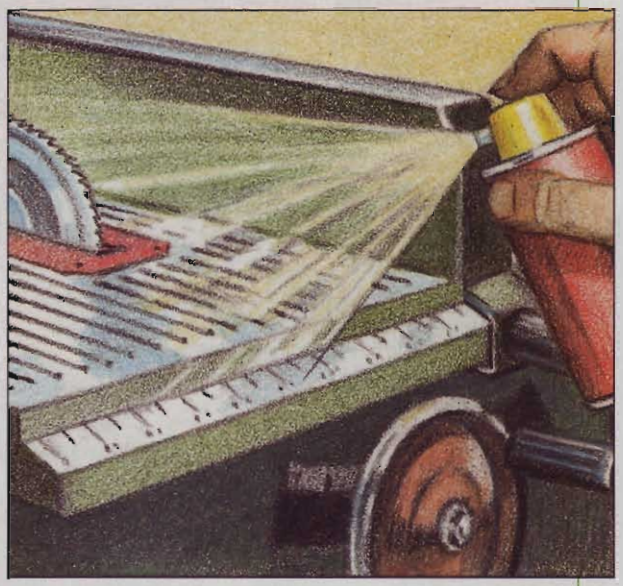
That doesn't always work, unfortunately. In that case, cut through the bubble in a straight line along the grain, using a razor-sharp knife. Inject white or yellow glue through the slit with a syringe, or work it in with a scrap of cardboard or veneer. Put wax paper over the top, then your dish towel, then press down with your iron set on medium. Keep checking the bubble. When it flattens, the two cut edges will overlap slightly. Use a straightedge and your knife to cut lengthwise down the middle of the overlap. The two edges should fit together exactly. Wipe off any excess glue, and weight down the repair overnight.

Continued on page 24

Rust on machinery

Q When I leave my shop building unheated during the winter, rust forms on the cast-iron tops of my machines. Waxing some years and wiping with motor oil other years seems to help, but nothing is 100 percent effective. How can I keep the rust away? Would cloth covers help?

—B.K. Kroll, Minneapolis, Minn.



A Yes, B.K., cloth covers will help protect your machinery from condensation, which leads to rust. Don't use plastic ones, because they'll trap moist air underneath. You can even find specially made covers at some stores that handle woodworking machinery. But before you put on those covers, set up another line of defense: Spray the unpainted surfaces of your machines with TopCote, an aerosol spray manufactured by Bostik and available at tool outlets.

Here are a couple of other ways to keep condensation under control: As long as the shop is unheated anyway, make sure it's well-ventilated and hang a burlap bag full of calcium chloride near your machines, with a bucket underneath. Moisture collects in the calcium chloride, then eventually drips from the bottom of the bag. You can buy calcium chloride at stores that stock materials for professional builders and concrete contractors.

Or you can go the opposite route. Close the shop up tight and set up a dehumidifier or two.

Continued on page 26

You can't give these bubbles the "brush off"

Q **Help! I'm getting air bubbles when applying varnish on some cherry drawer fronts. The brush (china bristle) and varnish are brand new and high quality, as is the cherry. My preparation involves wet sanding, wiping dry, and a thorough going-over with a tack cloth, but the bubbles appear instantaneously.**

—Scott Hopper, Edmonds, Wash.

A Don't blame your brush, your varnish, or the cherry wood, Scott. Bubbles just go with the territory when you brush on an oil-based varnish or one of the brushable water-based finishes. The brush creates a small "turbulence" at the surface that mixes air into the finish. If the varnish skins over before the bubbles have a chance to "pop," they stay on the surface.

Since varnish cures more quickly in warm temperatures, you need to slow it down by thinning it with 10 to 20 percent mineral spirits (or distilled water, for a water-based product). Stir the varnish; don't shake it. Experiment with the mix on a piece of scrap prepared the same way as your project, adding thinner until the bubbles pop before the varnish sets up. Finish each coat by "tipping" it off. To do this, hold the brush almost vertically and brush lightly with the grain. Level the varnish out from end to end. You'll take out most of the bubbles with your final brush stroke. Any bubbles that remain should "pop" on their own.

Be aware of the trade-offs in this process. Thinning the varnish means you'll need more coats. And slowing the curing increases your chances of getting dust in the finish, so take precautions to minimize dust.

These steps will work with oil-based varnishes and brushable water-based finishes. If using a water-based finish formulated for spraying, don't brush it. Change varnishes or spray it on.

Continued on page 28

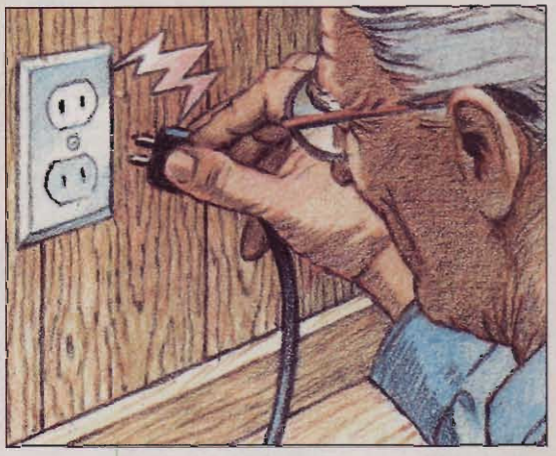
Pacemaker news that won't shock you

Q I just received a pacemaker, and I'm worried because my doctors say I have to be careful of vibrations and possible shocks from machines. I use routers, sanders, and all types of saws, and I don't want to give up my woodworking. Which machines are safe and which aren't?

—Lorraine McArthur, Parlin, N.J.

A Lorraine, we took your question to a top medical expert. Dr. Gerald Fletcher, a cardiologist at the Mayo Clinic in Jacksonville, Florida, says you can use your power tools without worry.

However, he suggests that anyone with a new pacemaker should take an observer along on that first trip back into the shop. It's possible that the electrical field from a poorly shielded tool could cause your pacemaker to slow down your heartbeat temporarily. If that should happen and you became lightheaded, you'd appreciate having someone with you. But that's unlikely to occur. Most workshop power tools will have no effect whatsoever. Just like the rest of us, you should check the cords of your power tools to make sure they're sound. You also can stand on rubber mats to protect against shocks. And the Occupational Safety and Health Administration recommends ground-fault circuit interrupters as the best electrical safety measure of all.



Got a question?

If you're looking for an answer to a woodworking question, write to: **WOOD Forum, 1716 Locust St., GA 310, Des Moines, IA 50309-3023**, or e-mail us at **woodforum@mdp.com**. For an immediate answer to your question, get help from fellow woodworkers by posting it on one of our Internet discussion groups at: **www.woodonline.com**.

Top Shop Tip winner George Yochem poses with the Olympic torch he helped design for the 1984 Summer Games.

Using his tablesaw just got safer for George Yochem. He's earned an Excalibur EXBC overarm blade cover for his efforts. Way to go, George!

Not many of us can boast of a connection with such famous Olympic athletes as Muhammad Ali and gymnast Kurt Thomas, but George Yochem can. Before he retired from his job as a tool-and-die maker, George designed several parts of the torch carried by those notables and others to the 1984 Summer Olympiad in Los Angeles. In fact, he still has a prototype model at his Illinois home.

After a recent visit to his grandson's elementary school to show off the torch, one youngster exclaimed, "I never knew somebody in our school had a famous grandfather!" After that kind of accolade, being named this issue's Top Shop Tip winner must be pretty small potatoes.

George's gold-medal tip is shown *at top right*, and we'd like to put your name there someday, too. Just send us your favorite shop tips, along with drawings or photos and your daytime telephone number. If we print your tip, we'll award you $75, and if the tip scores a perfect "10," we'll also throw in a tool prize worth at least $250.

Send those tips to:

Tips From Your Shop and Ours
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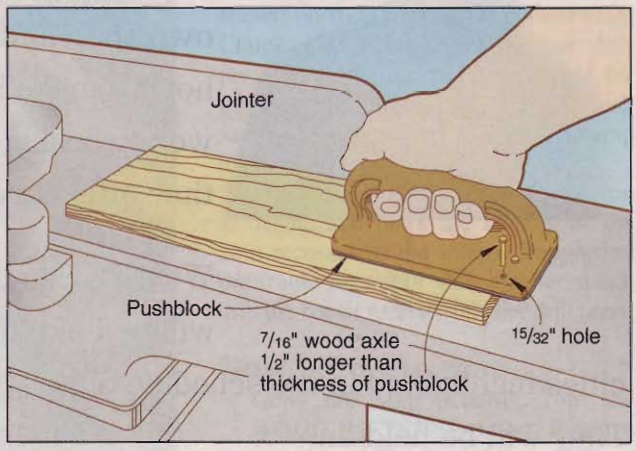
Dave Campbell
WOODWORKING PRODUCTS EDITOR

Double-axle is one of his best safety moves

I have a pair of those rubber-bottomed pushblocks to safely move stock across my tablesaw, router table, or jointer, but even they slip from time to time. To prevent this, I drilled two holes through each pushblock, as shown *below*, and dropped a wooden toy axle in each hole.

The axles hook the end of the workpiece to provide better purchase than the rubber alone. Yet, when I place the pushblock flat in the middle of a workpiece, the slightly larger holes allow the axles to rise without falling out. And, if I should accidentally nick or cut an axle, they cost only about 5 cents apiece to replace.

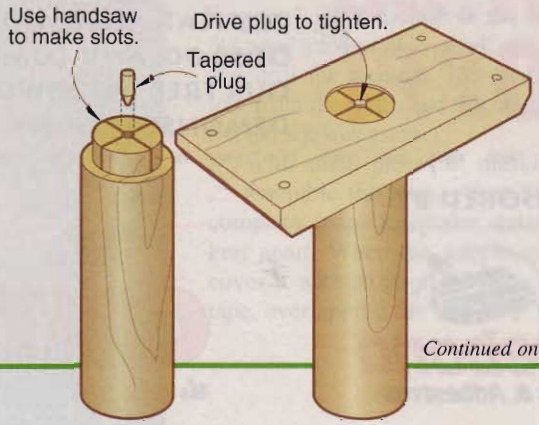
—George Yochem, De Kalb, Ill.



Well-rounded solution to turned tenons

The next time you need to install a turned tenon into a round mortise, such as when assembling a pedestal to a table, consider using a round wedge. As shown *below*, the round wedge, fashioned from a length of dowel, spreads the kerfed tenon evenly in all directions. And, should you ever need to remove the turning, just drill out the dowel; something you can't do with a flat wedge.

—Mike Burton, Ogden, Utah



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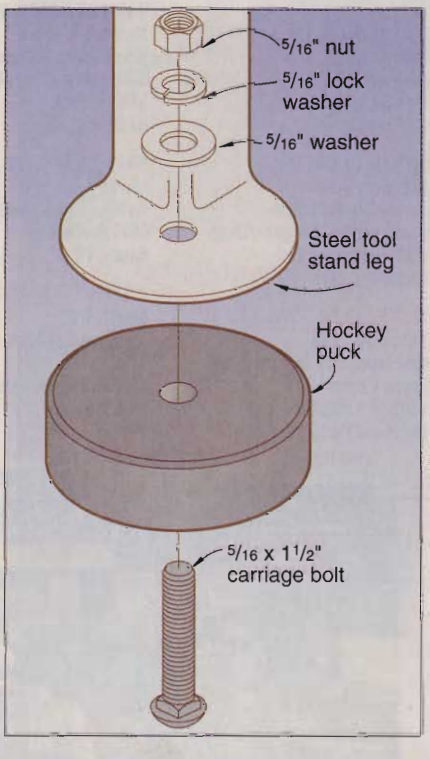
tips from your shop and ours

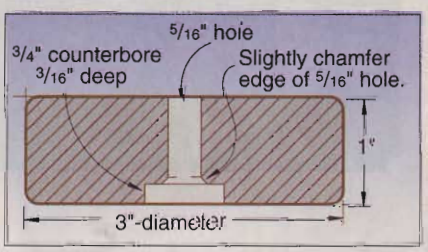
Hockey pucks halt tool stand vibration

Many of my stationary power tools came mounted on open metal stands. The stands support the machines just fine, but vibration makes them shift and shimmy across the smooth concrete floor of my shop.

Rather than bolt them in place, I found another solution that stops the vibration, yet lets me move the tools around. Using Forstner bits, I drilled holes for mounting bolts in ice hockey pucks (not street hockey pucks), as shown *below*. The rubber pucks provide solid footing for the tool stand legs, and slide easily on the floor.

—Joseph Wasnorowicz, Beacon, N.Y.





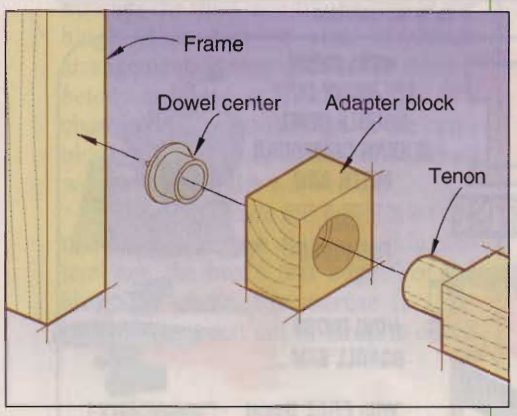
Dowel center helps position round tenons

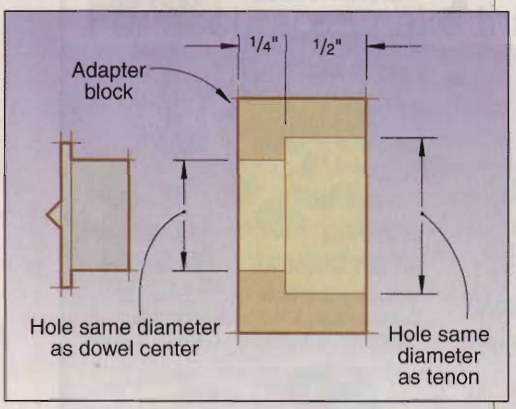
Transferring the centerpoints of round tenons to the mating frame member has always been a difficult task for me. So, I came up with a way to use standard dowel centers to do the job.

First, I cut a small square block from ¾" stock that's slightly larger than the diameter of the tenon. With a Forstner bit the same diameter as the tenon, I drill a centered hole ½" deep into one face of the block. Switching to a bit the same size as the dowel center, I drill the rest of the way through the block, using the center-point left by the Forstner bit as a guide for the second hole.

I insert the dowel center in the block, then fit the block over the tenon. The dowel center gives me perfect alignment for the tenon.

—Art Dimock, Barton, N.Y.





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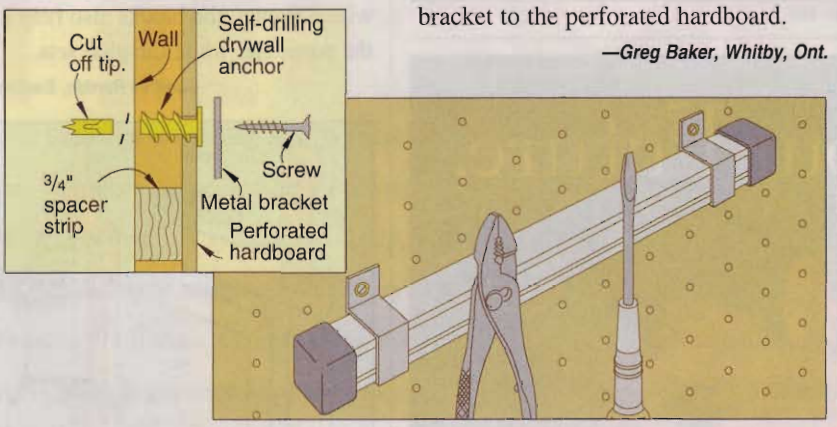
Drywall anchors a way to mount to perf-board

Despite the variety of hooks and brackets available for perforated hardboard, sometimes a good old screw is all you really need, say to hang a wooden bracket or magnetic tool strip. Because I have many such holders in my shop, I found a way to fasten screws securely in the perf-board: self-drilling drywall anchors.

The anchors' ¼" diameter perfectly match the holes in my perf-board, yet they don't destroy the hole going in or out, so I can rearrange as much as I want. I cut off the drilling tip and enough of the threaded end to allow the anchor to fit between the perforated board and the wall behind. Then, I use an ordinary wood screw to attach the bracket to the perforated hardboard.

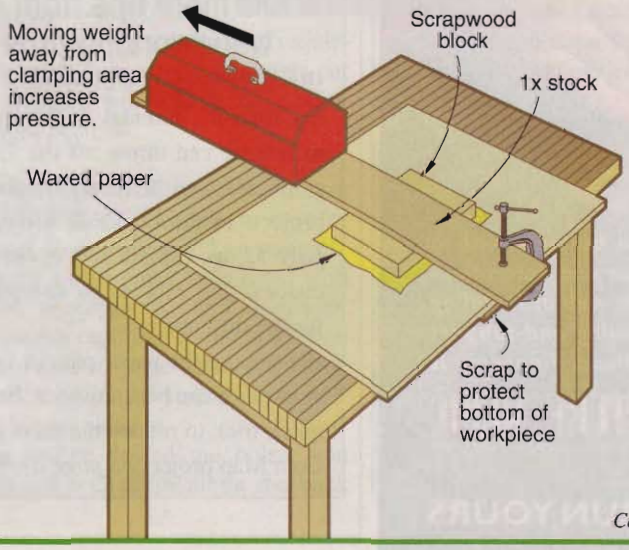
—Greg Baker, Whitby, Ont.



Going out on a limb for tough-to-clamp pieces

Here's a great way to get clamping pressure in areas that can't be reached with traditional clamps, say, when pressing veneer in the middle of a panel, or securing aprons to the underside of a table. First, clamp a long, sturdy piece of scrap stock to the workpiece, as shown *below*. Then, extend the scrap like a cantilever over the area to be clamped, and apply weight to the far end. In the case shown, I've added a block of scrapwood that acts as a sort of clamping caul to increase the pressure and direct it to a specific area. Waxed paper keeps me from gluing the block to the workpiece.

—Ed Monjack, Wheeling, W.Va.



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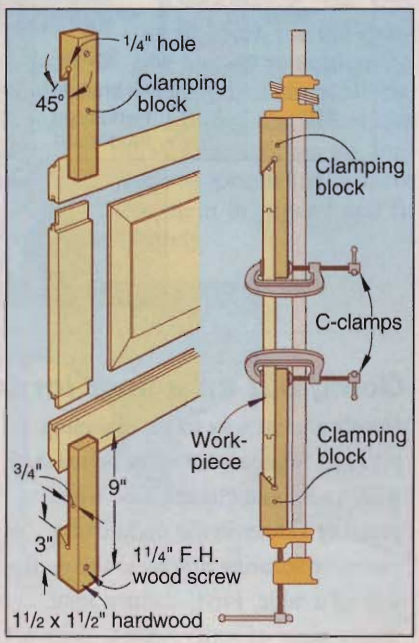
tips from your shop (and ours)

Beveled panels stay sharp

To clamp rail-and-stile panels with beveled edges, make the clamping blocks shown *below*. The ¼" hole inside the angled part of the block keeps the beveled edges of your workpiece sharp while the broad, flat end provides a solid clamping surface. With the addition of a pair of C-clamps, where shown, the blocks also help keep the panel flat while the glue sets.

—James Rankin, Easton, Pa.



A few more tips from our woodworking pros

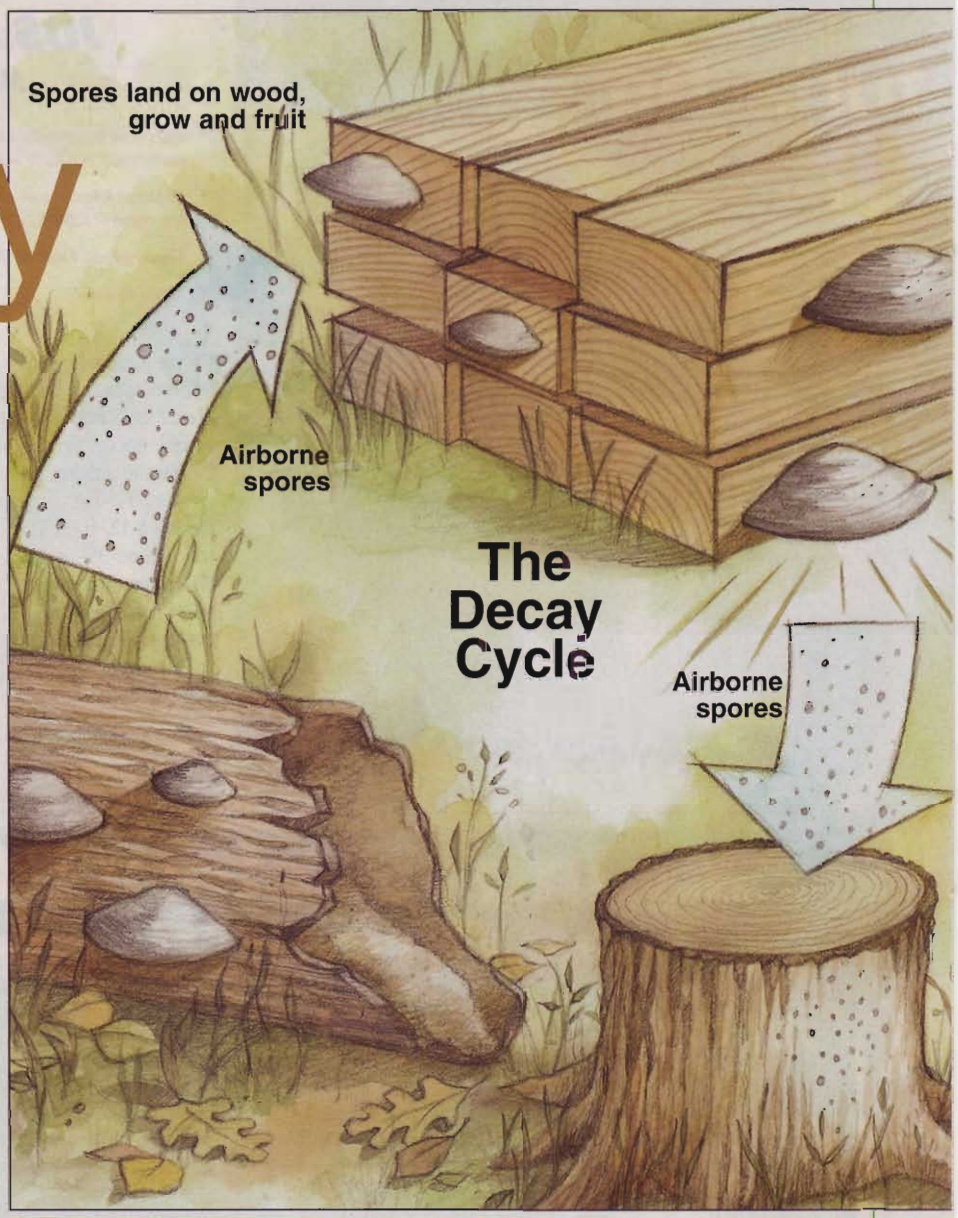
•Because hardwood plywood is thinner than its nominal thickness, the difference can throw off the dimensions of even a carefully planned project. In the bookcase project on *page 52*, we explain how to cut slots, dadoes, and rabbets to compensate for the difference.

•Removing the paper pattern from a workpiece can be a nuisance. Learn a quick trick to reduce the mess in the Coin Map project on *page 69*.

decay

how it works and ways to foil it

Wood, as a naturally produced organic material, is susceptible to many causes of deterioration, such as insect infestation, fire, and weathering. But decay ranks as the top biological destroyer of wood.



Fungi, born from spores just like mushrooms, attack because they're hungry.

Because they don't contain chlorophyll, the simple plants called fungi cannot produce their own food. Therefore, they must get their energy from other organic materials. Wood is an obvious choice because it's plentiful. Several hundred species of fungi in North America cause wood to stain, soften, and decay, and they're classified according to what deterioration they cause.

Decay fungi soften and weaken wood to the point that its physical characteristics actually change. There are two types of decay fungi: brown rot and white rot.

Brown-rot fungi create checks in wood perpendicular to the grain. The dried wood then actually breaks into cubes.

White-rot fungi change the color of the wood, making it look bleached as it

attacks from within. The wood may not change shape, but inside it eventually becomes a pulpy mass. When woodworkers find wood like that, with the discoloration of white rot just beginning, they call it spalted. It's frequently turned into bowls or made into jewelry boxes.

Other classes of fungi include:

Soft-rot fungi, which attacks very wet wood and penetrates it slowly, physically degrades it from the surface inward over a period of time.

Soft rot

Staining fungi (closeup)

Staining fungi, including molds and mildew, create bluish or blackish discolorations (in logging, called blue stain) that affect wood's appearance and value but do not have an effect on its structural strength.

Moisture always attracts the attackers

Except for those species that are known as water-conducting fungi, fungi only find it desirable to invade wood that contains sufficient moisture.

Generally, decay caused by fungi develops in wood with more than 20 percent moisture content. And if moisture conditions are right, fungi rapidly grow in a temperature range from 70–90°F. Temperatures below 32°F make them dormant, and above 100°F inhibit their growth or destroy them.

Three ways to foil fungi

Although new processes to protect wood from fungi damage have been studied, such as removing a taste-tempting B-complex vitamin found in it, there has been no real practical application. That leaves the three traditional approaches to preventing wood decay.

1 Keep wood dry. And that includes making sure buildings made from wood are dry. Usually, construction lumber in temperate climates never reaches the 20 percent moisture content needed for fungal growth. Woodworking stock kept indoors under controlled temperature conditions won't get that wet either.

2 Treat wood with chemicals. If wood—in storage or in use—can't be kept below 20 percent moisture content, the most practical way to ward off decay is to treat it with preservatives toxic to fungi. Pressure-treated wood then can be used in damp situations, even in contact with the ground.

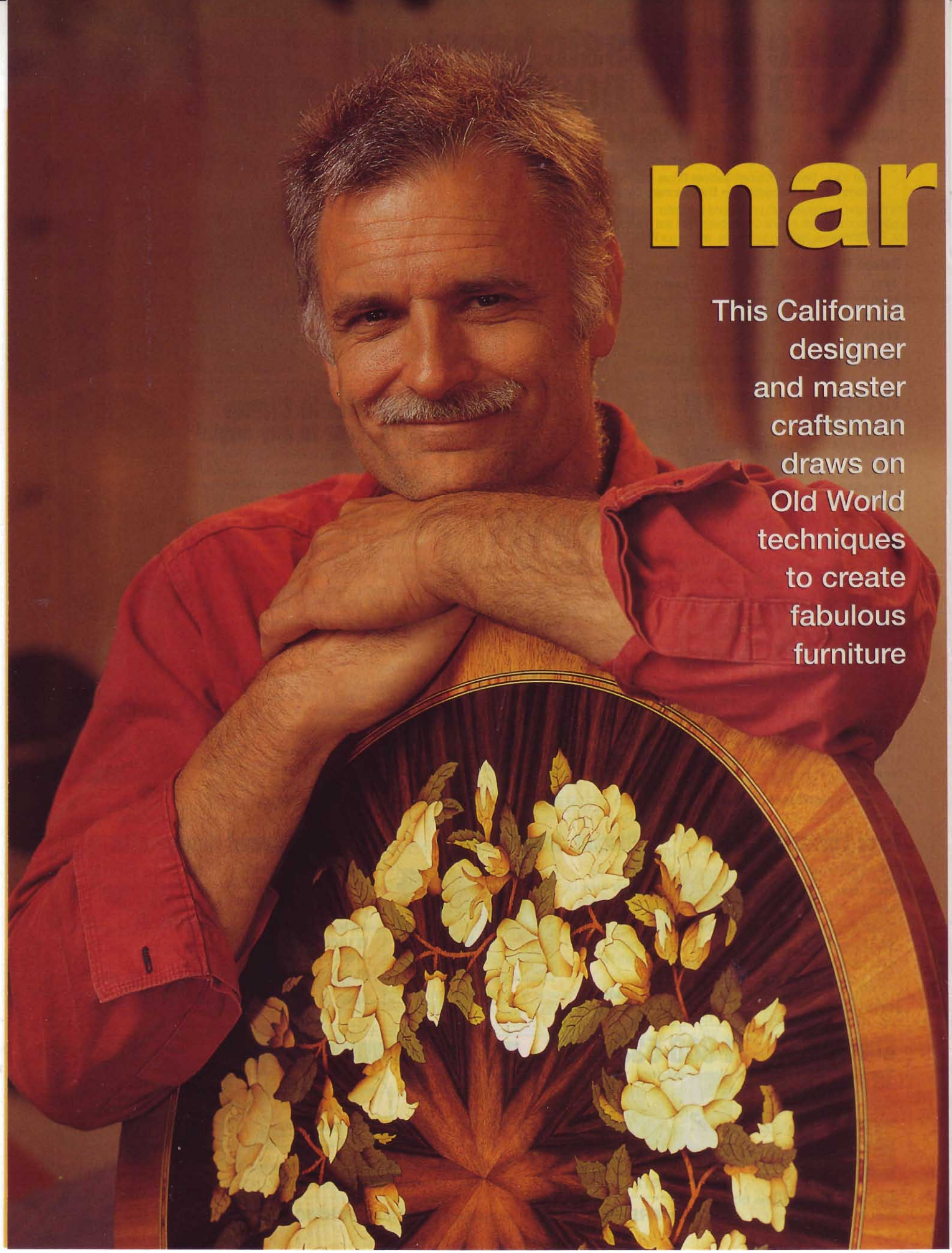
3 Use decay-resistant species. Sometimes, situations will allow the use of wood species that naturally fend off decay. Western red cedar and redwood are two examples of decay-resistant, commercially available woods that can be used where durability and appearance are considerations, such as for a deck. There is one small problem, however. Only the heartwood has enough of the necessary decay-resistant extractives, and specifying "heartwood only" for construction lumber adds expense. Listed below are some of the more decay-resistant woods grown in North America, although not all are commercially available.

Illustrations: **Brian Jensen**
Photographs: **U.S. Forest Products Laboratory**

These woods resist decay

- Bald cypress
- Catalpa
- Cedars
- Cherry, black
- Junipers
- Locust, black*
- Mesquite
- Mulberry, red*
- Oak
  - *Bur*
  - *Chestnut*
  - *Gambrel*
  - *Oregon white*
  - *Post*
  - *White*
- Osage-orange*
- Redwood
- Sassafras
- Walnut, black
- Yew, Pacific*

(*indicates highly decay resistant)



mar

This California designer and master craftsman draws on Old World techniques to create fabulous furniture

the quetry magic of Paul Schürch

Call out a country and Paul Schürch has probably been there, and maybe even learned a thing or three about woodworking. With years of world travel and study behind him, there's little wonder that conversations in the leading marquetry expert's Santa Barbara, California, workshop sometimes mimic those in a bustling European marketplace.

Thilo Roemer, a woodworker from Germany in a yearlong marquetry apprenticeship, listens as Paul excitedly describes one of his techniques—in German. If there's a purposeful anecdote from a trip to Italy, it's emphasized in Italian. Then there's French when the occasion arises, and Spanish, helpful for ordering *quesadillas* or *chile rellenos* at the Mexican eatery nearby. But despite the optional foreign vernaculars at Schürch Woodwork, the universal language is fine craftsmanship learned in the Old World tradition.

A real hands-on education

Paul, 46, grew to teenage in Santa Barbara, then he moved to Zurich, Switzerland, with his American mother and Swiss father, a scientist specializing in physics. "In California, I wasn't a very good student and didn't like school," he admits. "Instead, I'd rather work with my hands, building things. So my parents put me into a trade apprenticeship rather than a school."

In Switzerland as well as in many other European countries, apprenticeship programs sponsored by the trades are still a solid option to formal education. "Unfortunately, that's not true here in the U.S.," says Paul. "And we would greatly benefit by it, but there's not a lot of support for a trade system. Personally, I take on apprentices, but I have to pay them good wages, workmen's comp, and all that. Yet, I feel that I have a commitment to pass on what I've learned, not hang on to it. Besides, apprentices spur me on in developing new techniques, designs, and building pieces that are continually unusual. Right now, I'm at a very productive stage in my life."

The small table Paul calls "Rosie," shown *top right*, stands 24½" high with a top 24½" in diameter. It has over 600 pieces of wood in its motif. It sold for $10,000. This display cabinet, *left*, has doors that revolve to open lazy-susan-style. Inside, lights show off its contents. Case and trim are cherry; marquetry is myrtle burl, tulipier, poplar, imbuya, purpleheart, maple, and tulipwood.

In Bern, Switzerland, Paul apprenticed in a piano-building program. It lasted only two years. He grew discontent with its repair orientation and transferred his apprenticeship to one focused on constructing church organs.

"In organ building, the craftsmen dealt with leather, plastics, welding, cabinetmaking, gold-leafing, design—everything!" says Paul. "It was inspiring to work with all those different materials, and to combine them. That gave me the confidence to take on challenges in different areas later on."

Paul worked four years to earn his journeyman's degree. That was followed by two years of field experience before finally deciding to return to Southern California. "They gave me a wonderful base of know-how that I draw upon to this day. I learned not only how to visualize a project but to break it down into its components, pay attention

A full-size marquetry pattern, or "cartoon," begins at the drafting table. It may take months to develop and synchronize with complementary veneers.

to detail, and follow through. But I had to move on," he adds.

To school once again

Paul was foot-loose after returning to Santa Barbara. "I was 22 years old and wanted some freedom from the discipline and rigid social structure I'd lived under in Switzerland. So I bought a motorcycle, a Skilsaw, some hand tools, and traveled around for two years to job sites as a carpenter," he explains, smiling at the memory.

Eventually, though, Paul's acquired skills and a strong desire to create resulted in the opening of a shop. "I came back to the States to start working on furniture, and finally settled down and did it," he says. But he discovered that there was more learning to do.

"For the first three years, I was building fine cabinets and designing and making some furniture. Yet, there was a gap in my knowledge," Paul notes. "I was having difficulty incorporating the curves that I wanted into my furniture. As woodworkers, we think linearly—straight cuts, straight lines, 45°, boxes. I found that I had developed a box mentality and needed to break out of it. So where do you have woodwork that involves lots of shapes, undulating forms, and curves? Boat building!"

Accordingly, Paul spent a year in England attending the International Boat Building School. "I worked on all kinds of wooden boats, the largest being 100' long and the smallest an 8' dory. I got an amazing feel for how far you can push wood," he recalls. "Yet the most valuable skill that I learned is called 'fairing a curve.' What makes it fair? You can only see it—no bumps, no flats, just a graceful curve. It's like a ballet movement. On furniture, it's the very lightly faired curves that make a piece stand out."

The road to marquetry mastery

"My introduction to marquetry only began about 15 years ago," Paul relates. "One day an interior designer came into my shop. He wanted a large marquetry table inlaid with stone and asked if I could do it," the craftsman continues. "Even though I'd never done anything like that, I said, 'Of course,' and got the the job. Then I sweated bullets for a week. I knew nothing about veneer and was afraid of it because it's a thin and fragile thing. It tears, warps, cracks, and there wasn't very much written about it."

Every veneering technique Paul tried ended in failure. Desperate, he decided to inlay everything into solid wood. "This nightmare continued for six or seven months," he says about the table. "And somehow or another I finished it. The client was happy. But I almost went broke because I had only charged one tenth of what it should have been worth for all the time I put in."

Again disgusted with this gap in his skills, Paul took off for Europe to seek out craftsmen who knew what he didn't about marquetry and inlay. "I had to find them," he says. "They had to be there because they certainly weren't in America that I knew about!"

Finally, in northern Italy, Paul found a master who created marquetry for the European furniture market. "I was greeted with open arms," Paul remembers. "But even then the craft was dying out. The young people didn't want to take the time to learn something that didn't pay very well. That's why he was so eager to take me in."

On that first trip, Paul stayed three weeks, learning production marquetry. "In that time, I only made a simple floral design, but I had the technique to take home with me and use," he says excitedly. And that was only the beginning.

At home, Paul experimented with his new knowledge. However, he soon realized that there was much more to know. So it was off to Italy again and again—for up to a month—each time working on more intricate pieces.

"I would gather commissioned projects—veneer panels for cabinet fronts and tabletops that could be hand-carried on a plane in a 24x30" case—and take them back to my teacher," Paul remembers. "I had bench space there and help when I needed it. The last time I went, though, was about four years ago. At that time, I was actually teaching some of the new employees how to do marquetry. That's when I knew that I didn't need to return."

Old World cutting techniques

"Marquetry, as I learned it, is working veneer for the background and the design, called the motif, at the same time to create one 'skin' that will be glued to the solid wood. This could be a top, side, or other decorative element of a piece of

furniture. This method allows you to do marquetry more quickly and easily," explains Paul. "Inlay is routing or cutting out a recess in wood to accept either a contrasting wood, bone, shell, or stone." (See "Pietra dure up close" on *page 48.*)

The Old World marquetry method Paul employs uses three distinct techniques—*packet cutting, contour cutting, and knife cutting*. Each comes into play in the process of creating a veneer skin.

"Packet cutting is a process of scrollsawing several layers of stacked veneer. All the segments of the pattern drop out like a jigsaw puzzle to be reassembled," he says. "If I stack green, red, and yellow veneers together, then cut out the pattern, the resulting pieces give me the material for three treatments of the same design. The blade, of course, has to be thin for a tight kerf, which will get filled in during the finishing process. I use a #000 blade with about 60 teeth per inch.

"Some parts of a pattern may not be numerous enough to warrant a whole sheet of veneer for packet cutting. Those pieces I'll contour-cut, also on the scrollsaw," Paul continues. "I'll paste a pattern from the main design, called the cartoon, onto a piece of veneer, then cut its outline for fitting into the veneer skin. This requires more precision than packet cutting."

The background of a marquetry pattern can be "knife-cut" with a sharp chisel, as apprentice Thilo Roemer does here while Paul looks on.

The third technique, knifing, is simple enough. "Knifing is putting larger veneer pieces, as for a background, together with the use of a very sharp 1½" chisel," notes the woodworker. "To do it, you make a score line, then follow it to cut all the way through the veneer. Using the veneer itself as a fence, you can actually inset one piece of veneer into another. A chisel is better than a scalpel or craft knife because it has the weight and mass that you need to effortlessly make a cut. The cutting edge, though, has to have a roundness at its corners so that it goes where you

At his rigid-arm, foot-controlled scrollsaw, Paul cuts out the pieces for the floral marquetry pattern of a jewelry box. In packet cutting, Paul saws a stack of as many as 16 different veneer layers. This production method gives him the material for at least four versions of the marquetry design to use on four projects.

want it to instead of it finding its own way through the grain."

Creating a veneer skin

It may take Paul nearly a day to packet-cut a highly intricate floral motif at his scrollsaw, an old yet sturdy rigid-arm Delta Rockwell with a 24" throat. The craftsman prefers its straight up-and-down cut to the rocking one of the newer, constant-tension machines.

"I can cut a maximum of 16 layers at a time," Paul offers. "But usually it's 14. I might have four layers of background, four for leaves, and four for stems. Then I have a top layer and a bottom layer to keep things condensed. My initial cut goes around the entire motif and drops the flowers out as a unit. Later, I'll contour-cut the leaves. When I'm finished, I'll have enough for four skins."

Paul's "Ribbon High Cabinet" has a walnut frame with a marquetry pattern in Swiss pear and satinwood, and features faired curves.

As the packet-cutting progresses, Paul carefully lifts out each stack of pieces with veneer tongs, then carefully sorts and arranges them on a tray. He'll later reassemble them with their knife-cut background veneer in the layout and veneer-press room of the 2,600-square-foot shop.

To assemble the skin, Paul employs a thin, nearly transparent veneer tape, putting it down on what will become the face side of the pattern. Because its adhesive is water-soluble, he can easily remove the tape once the skin has been glued in place. (But to avoid raising the veneer's grain, Paul simply sands it off.)

With all the cutting and handling in the creation of a marquetry skin, there's always the chance of chipping or otherwise damaging the veneer. A simple visual check highlights any necessary repairs. To do this, Paul holds the thin skin up to a window. Backlit by the natural light, the saw kerfs in the skin show up like minute rivers. Pinpoints of light indicate areas for repair.

"I use veneers that range from 1/36" to 1/40" thick, and they're more malleable than you'd think," Paul confides. "I can even pound them to flatten and fill gaps. But tiny chips in the skin I have to fill with a paste made of dark wood dust and hide glue after it is glued in place. To shield surrounding areas from the paste, I use a sealer of thinned shellac."

The sun does some work

Ever since learning his special brand of marquetry, Paul has incorporated it into all types of furniture. But how and where he uses it dictates the means to adhere it to the surface.

"For smaller tabletops and cabinet doors, I hot-press it," says Paul. "That means I place a large metal plate out in the sun to heat up. While that's happening, I apply hide glue to the surface receiving the veneer and then lay down the skin. When the plate gets hot, I place a sheet of Visqueen over the skin to protect it, then bring the plate inside and place it on top of the veneer. The low heat re-liquifies the hide glue and spreads it entirely between skin and surface when it goes under the veneer press." (If you're wondering why Paul

Pietra dure close up

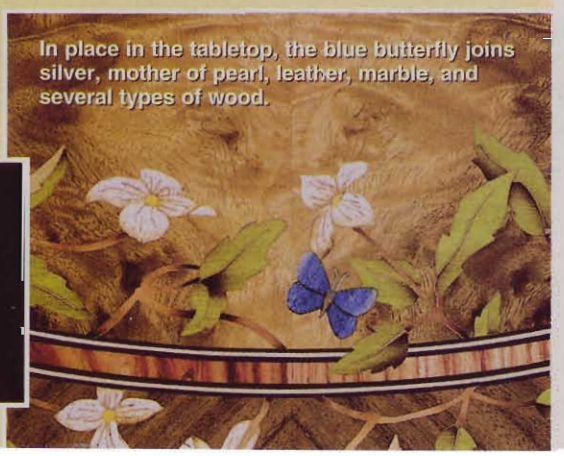
In Italian, *pietra dure* means the art of stone inlay. "And it takes so much concentration that in comparison, marquetry is a piece of cake," says Paul.

The well-traveled craftsman learned pietra dure in the same way that he'd learned the secrets of production marquetry—by spending time with an Italian master until the skills were acquired. "In a month, I was taught the real meaning of patience," Paul says seriously, "because in pietra dure there's no room for error."

Whether it be marble, slate, or a semiprecious stone, such as azure-blue lapis lazuli, the stone first must be cut to rough shape after affixing the paper pattern to it with beeswax. Depending on its size, Paul uses either a small diamond bandsaw or a wire saw. "A wire saw is nothing but a traditional woodworker's bow saw fitted with a string of steel wire," he explains. "But you must use a silicone carbide lubricant."

To further finish the stone, Paul then wedges it into a wooden bird's-mouth clamp and begins detailing with jeweler's files. The lapis lazuli butterfly he's working on in the photo *above* may take a week to complete. When finished, the butterfly will be inlaid carefully with epoxy into its recess in the tabletop, as shown *below*.

With jeweler's files, Paul carefully works a stone butterfly for inlay, *above*. Using tweezers, Paul insets the stone butterfly, *far left*, into its tabletop recess.



In place in the tabletop, the blue butterfly joins silver, mother of pearl, leather, marble, and several types of wood.

Paul holds the completed, taped-together veneer "skin" to the window to check for chipped-out areas that will need filling.

uses hide glue, he says it's because it's easily repaired, aggressive like contact cement, and you can't peel the veneer back up unless you heat it.)

For curved or round projects, Paul has a vacuum press to attach the veneer. For large pieces, he turns to either a 4×8' or an 8×8' veneer press.

Finish and move on

Much of Paul's marquetry furniture receives two sprayed-on coats of conversion varnish. This type of finish provides a tough, durable, protective coating. Sometimes he uses tung oil, varnish, and wax. His favorite for marquetry tops and panels, however, is the deep richness of shellac applied in a French polish.

"In French polishing, I put thin layers of shellac down with a pad—a tampon made of old linen. When you pad it on, shellac gets harder than if it were laid down with a brush," Paul explains. "And I use 'super blonde' shellac flakes from Behlens that I mix and dewax myself. This is the most refined, clearest shellac available. For a solvent, I use anhydrous alcohol because it's 99 percent pure with no water—it evaporates faster. But I have to buy it from a science supply house. With anhydrous, I can build up 40 layers of shellac in one day by putting down two coats every 15 minutes. Complete, it's like looking into a pool."

One final touch included with every piece of furniture that comes out of Paul's shop is highly unique. In a packet, he supplies detailed information about how the piece was constructed and the materials used, should someone have to repair it in the future. "I've seen too many disasters in furniture repair," he says. "And I don't want mine to be treated that way, no matter what I may move on to do in the years ahead."

Written by **Peter J. Stephano**
Photographs: **Bill Boyd**

Want to see more marquetry?

To see more of Paul's marquetry furniture, visit his web site, www.schurchwoodwork.com. He is also a visiting instructor at Marc Adams School of Woodworking in Franklin, Indiana (317/535-4013), and demonstrates in selected cities at The Woodworking Shows (800/826-8257).

make a federal case

With fluted pilasters and a keyed arch topped by a broken pediment, this project brings the vocabulary of classical architecture into the living room.

As a bookcase fitted with wood shelves, it's a home for your personal library. By installing lights and glass shelves you can display fine collectibles. Or, if you wish, combine the two as we did for the best of both interests.

In this project you'll learn how to rout flutes by using a simple auxiliary base with your plunge router. And large cove moldings are a breeze with just your tablesaw and a straightedge.

First, build a simple carcase

1 From ¾" cherry plywood, cut the sides (A), top/bottom (B), and back (C) to the sizes in the Bill of Materials. Using a dado blade in your tablesaw, or a handheld router and straightedge, cut the ¾" dadoes and rabbets for the top, bottom, and back and the ⅝" grooves for the shelf standards in the sides (A), as shown on the Side drawing.

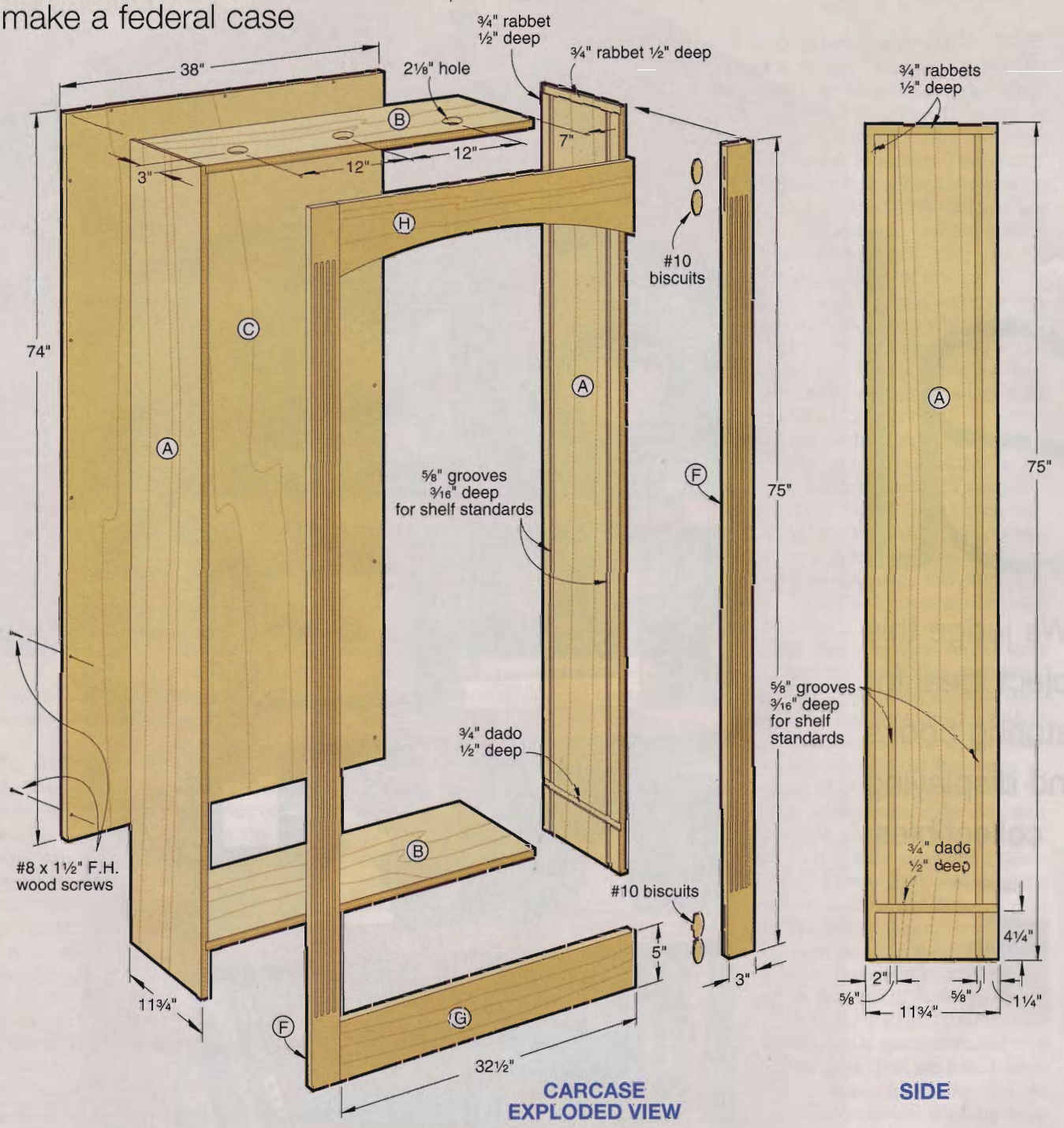
2 If you are installing lights in your bookcase, bore the holes in the top, where shown on the Carcase Exploded View drawing. We purchased our set of three low-voltage halogen lights, complete with a transformer, at a home center. Purchase your lights, and check the mounting requirements before drilling.

3 Glue and clamp the top and bottom (B) into the sides (A), aligning the front edges. Glue and screw the back (C)

shop tip **Working with nominal thicknesses.** The actual thickness of hardwood plywood is about 1/32" less than its nominal dimension. When cutting the rabbets and dadoes in the sides (A) to accept the top and bottom (B), set up your cuts with scrap pieces by measuring the thickness left, rather than the depth cut. For example, when directed to cut a ½"-deep dado in nominal ¾"-thick plywood, adjust your depth of cut to *leave* ¼". The actual depth of the dado is about 15/32". The proper outside dimension of the carcase is maintained, and the only other adjustment is lengthening the shelves.

al

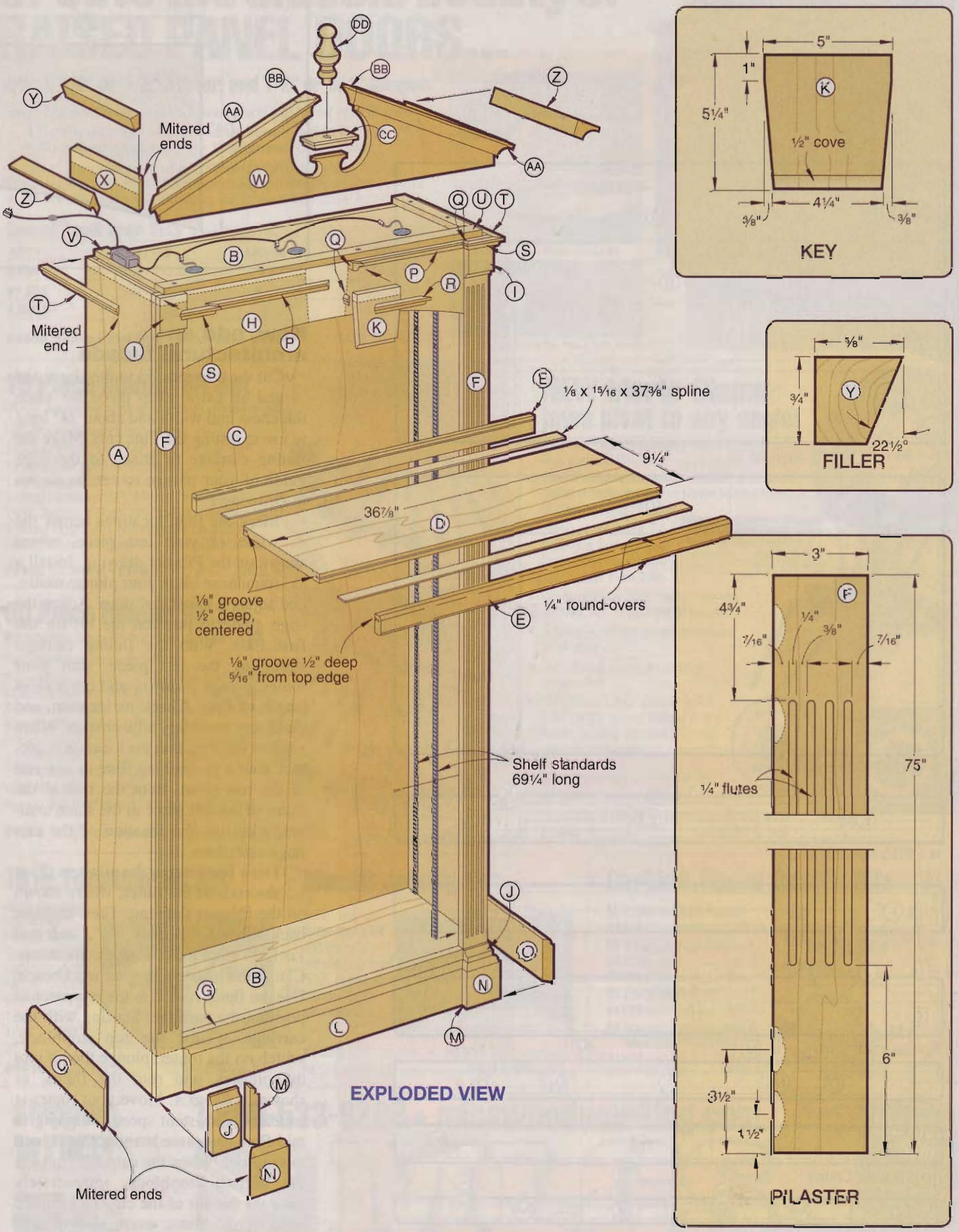
We judge this project ideal for storing books and displaying collectibles.



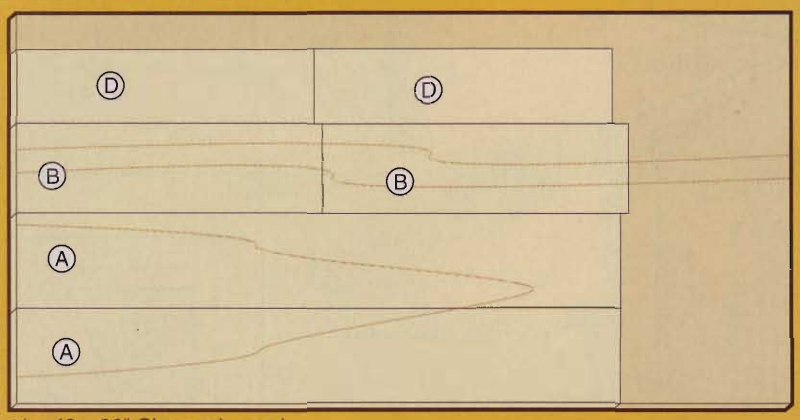
in place, aligning its top edge with the carcase top. The back extends beyond the carcase bottom, but not all the way to the floor.

4 Cut the shelves (D) and shelf edges (E) to size. Check the inside width of the carcase; the length of the shelves and edges is ⅛" less than this dimension. Adjust your tablesaw blade to cut ½" deep. Fasten a tall auxiliary fence to the rip fence, and position it to center the blade on the thickness of your plywood. With the top faces against the fence, cut grooves in the shelves, as shown on the Exploded View drawing. Without changing the setup, cut the grooves in the shelf edges. Cut splines from ⅛" hardboard, and glue and clamp the edges to the shelves. When the glue dries, remove the clamps and rout the round-overs on the shelf edges (E) where shown.

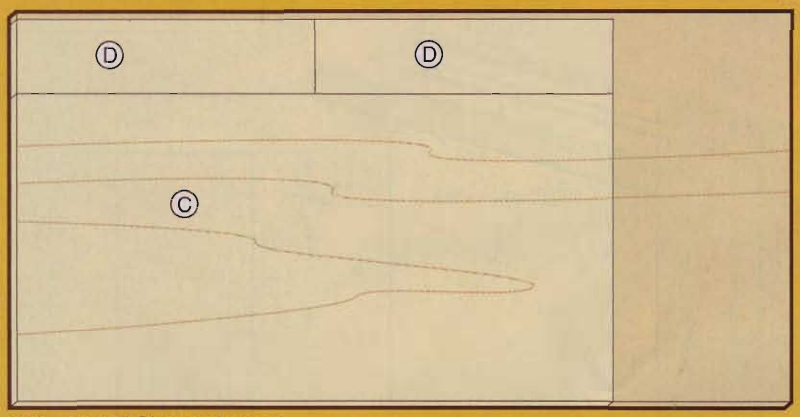
Note: *The Bill of Materials lists material to make four wood shelves. If you substitute glass shelves, make the necessary adjustments. Our glass shelves are ⅜"-thick with finished edges.*


DD
BB
BB
AA
AA
CC
Y
Z
Z
X
W
Mitered ends
V
B
Q
Q
U
T
S
P
R
I
T
Mitered end
H
P
K
I
S
F
E
1/8 x 15/16 x 37 3/8" spline
F
C
A
9 1/4"
36 7/8"
D
1/8" groove 1/2" deep, centered
1/4" round-overs
E
1/8" groove 1/2" deep 5/16" from top edge
Shelf standards 69 1/4" long
J
O
B
G
N
L
M
O
M
J
N
Mitered ends
EXPLODED VIEW
5"
1"
K
5 1/4"
1/2" cove
4 1/4"
3/8"
3/8"
KEY
3/8"
3/4"
Y
22 1/2°
FILLER
3"
F
4 3/4"
1/4"
3/8"
7/16"
7/16"
75"
1/4" flutes
6"
3 1/2"
1 1/2"
PILASTER

cutting diagram

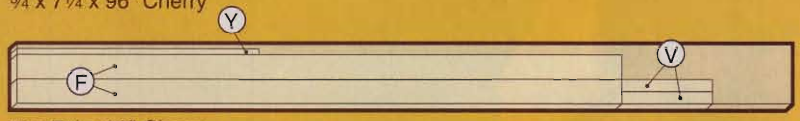


¾ x 48 x 96" Cherry plywood

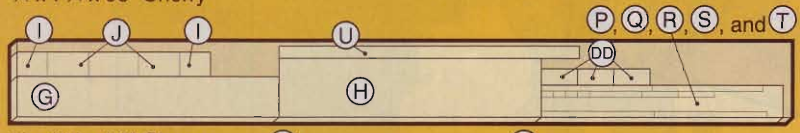


¾ x 48 x 96" Cherry plywood

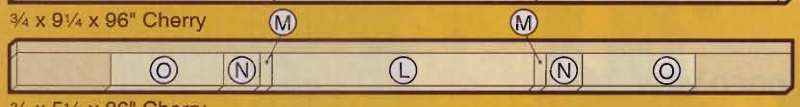
¾ x 7¼ x 96" Cherry



¾ x 7¼ x 96" Cherry



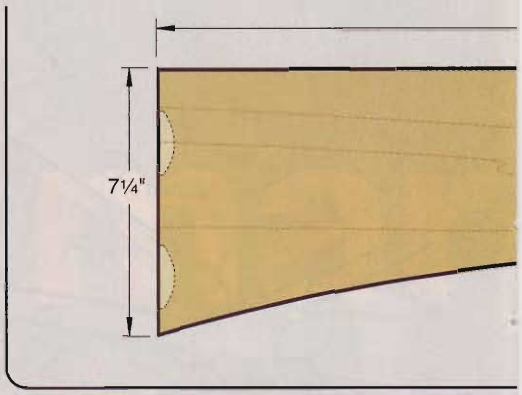
¾ x 9¼ x 96" Cherry



¾ x 5½ x 96" Cherry

¾ x 5½ x 96" Cherry

¾ x 3½ x 96" Cherry (2 needed)

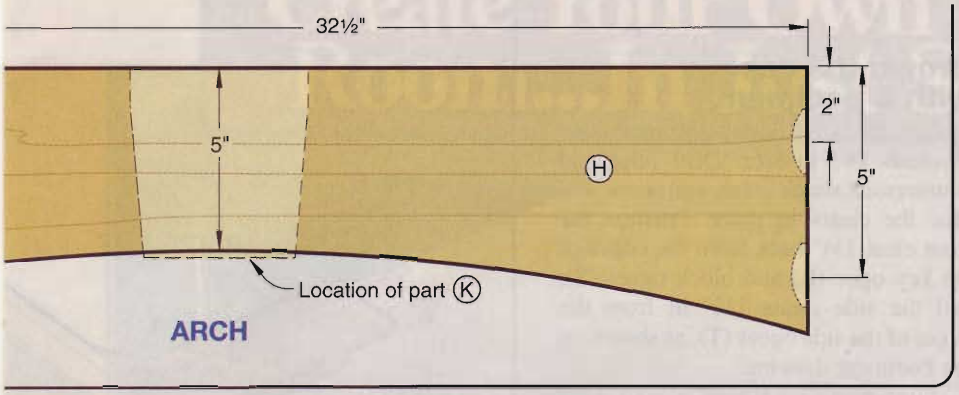


Now, add an architectural facade

1 Cut the pilasters (F) to the size listed and an extra scrap piece the same thickness and width and about 24" long to use in testing the flute cuts. Make the fluting carriage to attach to the edge guide of your plunge router, as shown in *Drawing 1*.

2 Mark the flute locations across the width of your test piece, where shown on the Pilaster drawing. Install a ¼" roundnose bit in your plunge router, and adjust it to cut 3⁄32" deep. Adjust the edge guide to position the bit for the first flute. With the fluting carriage straddling the test piece, start your router, plunge it down, and cut a short length of flute. Check its location, and make any necessary adjustments. When you are satisfied that the location is correct, rout a positioning flute at one end of the test piece. Rout the rest of the flutes in the test piece in the same manner, adjusting the location of the carriage each time.

3 Draw lines across the pilasters (F) at the ends of the flutes, where shown on the Pilaster drawing. Then measure back toward the ends 3⅞", and nail ¾×1×3" stopblocks at these locations. Clamp the pilasters to your workbench. Use the flutes routed in the test piece to position the carriage. Starting with the carriage against the top stopblock, switch on the router, plunge the bit into the pilaster, and rout the flutes, as shown in *Photo A*. Move your router at a steady, consistent speed. Stopping in mid-flute can cause burning that is hard to sand out. When the carriage contacts the bottom stopblock, immediately raise the bit out of the cut. To keep the ends of the flutes even, always start

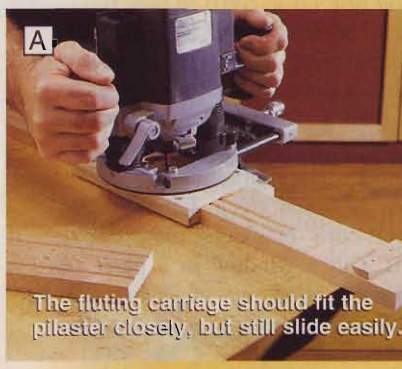


with the same end of the carriage against the top stopblock. To avoid multiple setups, rout the flutes in both pilasters at each setting.

4 Cut the base rail (G) and arch blank (H) to the sizes listed. Mark the 5" center width on the arch blank, where shown on the Arch drawing. Flex a thin strip of wood to the shape of the arc, tying a loop of string around the strip's ends to hold the curve. Use this strip to draw the curve on part H, then bandsaw and sand to the line.

5 Mark the biscuit locations on the base rail, arch, and pilasters. Plunge the biscuit slots. Glue and clamp together the rail/arch/pilaster frame. Check for squareness by measuring the frame's diagonals. When the glue dries, glue and clamp the frame to the carcase.

6 To make the upper pilaster blocks (I) and lower pilaster blocks (J), start with a ¾×3×24" board. Install a ½" cove bit in your table-mounted router. Using your miter gauge fitted with an auxiliary fence to back the cut, rout coves on both ends of the board. Cut 3¾" off both ends for parts I. Rout coves on the ends again, and cut 5" off the ends for parts J. Cut the key (K) to size, and rout the cove. Mark the side tapers, as shown on the Key drawing.



The fluting carriage should fit the pilaster closely, but still slide easily.

DRAWING 1
Fluting Carriage

bill of materials

federal bookcase

Part		FINISHED SIZE T	W	L	Matl.	Qty.
A	sides	¾"	11¾"	75"	CP	2
B	top/bottom	¾"	11"	38"	CP	2
C	back	¾"	38"	74"	CP	1
D	shelves	¾"	9¼"	36⅞"	CP	4
E	shelf edges	¾"	1½"	36⅞"	C	8
F	pilasters	¾"	3"	75"	C	2
G	base rail	¾"	5"	32½"	C	1
H	arch	¾"	7¼"	32½"	C	1
I**	upper pilaster block	¾"	3"	3¾"	C	2
J**	lower pilaster block	¾"	3"	5"	C	2
K	key	¾"	5"	5¼"	C	1
L**	base ogee	¾"	4"	32½"	C	1
M**	base return ogees	¾"	4"	1½"	C	2
N**	base block ogees	¾"	4"	4½"	C	2
O**	base side ogees	¾"	4"	14"	C	2
P**	arch ogees	¾"	¾"	13¾"	C	2
Q**	return ogees	¾"	¾"	1½"	C	4
R**	key ogee	¾"	¾"	6½"	C	1
S**	block ogees	¾"	¾"	4½"	C	2
T**	side ogees	¾"	¾"	14	C	2
U	front cleat	¾"	1½"	37¼"	C	1
V	side cleats	¾"	1½"	11⅛"	C	2
W*	pediment front	¾"	9"	38¾"	EC	1
X*	pediment sides	¾"	2⅞"	13⅜"	C	2
Y**	fillers	⅝"	¾"	13⅜"	C	2
Z**	side cove	1½"	1½"	147⅞"	LC	2
AA**	front cove	1½"	1½"	20½"	LC	2
BB**	cove return	1½"	1½"	2¼"	LC	2
CC	finial base	¾"	2¼"	5"	C	1
DD*	finial	2¼"	2¼"	5⅝"	LC	1

*Parts initially cut oversize.
**Multiple parts cut from a longer blank.

Materials Key: CP–cherry plywood, C–cherry, EC–edge-glued cherry, LC–laminated cherry.

Supplies: #8×½" roundhead wood screws (4), #8×¾" flathead wood screws (6), #8×1½" flathead wood screws (16), #10 biscuits (8), ⅛" hardboard, glue, stain, clear satin finish, low-voltage halogen light kit (3 lights with transformer), ⅜"-thick glass shelves (optional).

Buying Guide

The following items are available from Constantine's: recessed-mount 72" brass-finish pilaster standards no. 125B6, $3.95 each (4); brass-finish shelf supports no. SS21B, $1.75/10 pack (2 packs); hardwood finial no. WF52, $4.95; self-adhesive rubber bumpers (for optional glass shelves) no. CH462, $1.95/100 pack. Call 800/223-8087. Add shipping, NY; FL residents, add tax.

Bandsaw and sand to the line. Glue and clamp parts I, J, K to the pilasters and arch, where shown on the Exploded View and Arch drawings.

7 Because you want the wood grain of the base ogee moldings L, M, N, O to be continuous, cut a ¾×4×84" board for these parts. Install an ogee bit (Freud #99-006 or equivalent) in your table-mounted router, and rout one edge of the board. Miter-cut the base ogee (L) to length from the center of your board, and glue and clamp it in place. Keeping the left and right cutoffs in order, miter-cut in turn the base return ogees (M), base block ogees (N), and base side ogees (O). Glue and clamp the parts in place as you cut them.

8 For the ogee molding P, Q, R, S, T, cut a ¾×4×30" board. Rout ogees on both edges, set your tablesaw rip fence at ¾", and rip off both these edges. Joint one edge of the remaining board, and rout and rip a third piece of ogee molding. To assist in aligning the ogee moldings flush with the carcase top, clamp a piece of plywood large enough to protrude at the front and sides of the carcase. Cut, fit, and glue the moldings in place in their alphabetic sequence, as shown on the Exploded View drawing, pushing the molding up against the protruding plywood. We used Titebond Wood Molding Glue because of its strong initial tack and fast set. Remove the plywood.

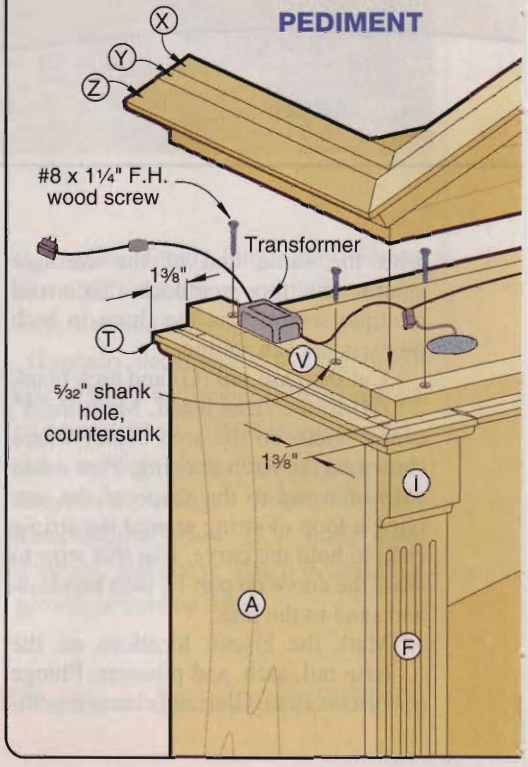
Crown the case with a pediment

1 Cut the front cleat (U) and side cleats (V) to size. Drill pilot and countersunk shank holes, and screw and glue the cleats in place. Position the front cleat 1⅜" back from the edges of the key ogee (R) and block ogees (S), and the side cleats 1⅜" in from the edges of the side ogees (T), as shown on the Pediment drawing.

2 Edge-glue a ¾×10×40" blank for the pediment front (W), and miter-cut it to length. Cut two ¾×3½×14" blanks for the pediment sides (X), and miter-cut them to length. When placed against the cleats, the pediment front and sides overhang the arch ogees (P) and side ogees (T) by ⅛".

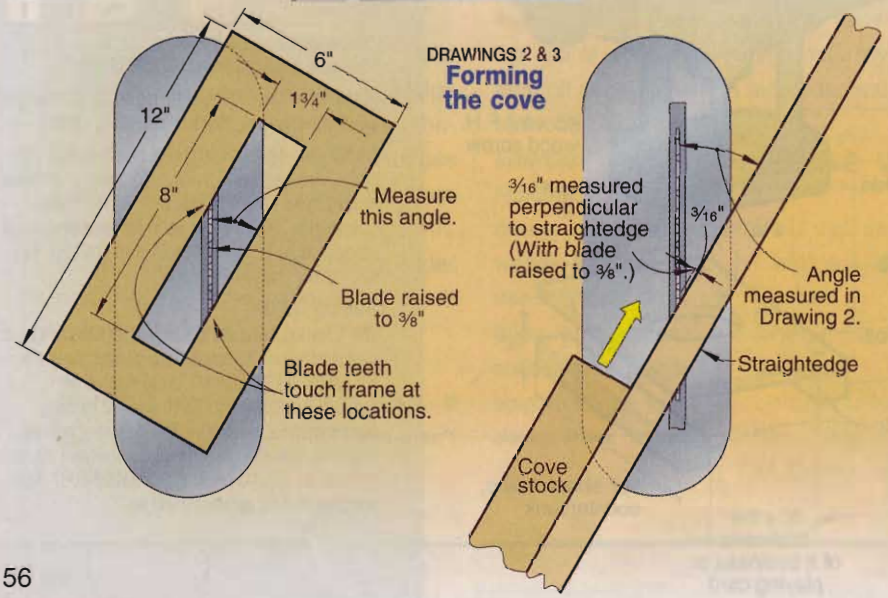
3 Make two copies of the Pediment Front from the *WOOD PATTERNS®* insert. Because one half-pattern is reversed to make the full pattern, cut it along the pattern lines. Adhere the pattern halves to the blank with spray adhesive, matching them at the cutline. Install a fine blade in your jigsaw, and cut and sand to the pattern line. Glue and clamp the pediment front to the cleat.

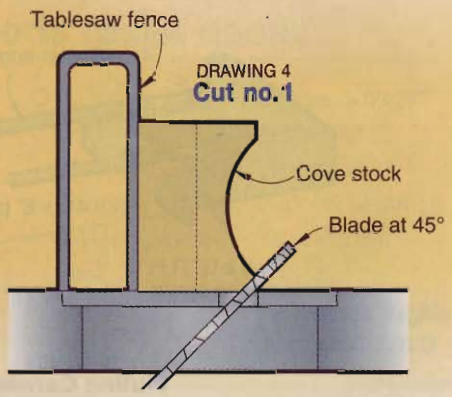
4 Fit the pediment sides (X) in place, and mark the 22½° slope of the pediment front on their mitered ends. Tilt your tablesaw blade to this angle, and bevel-rip the pediment sides to width. Glue and clamp the pediment sides to the cleats.

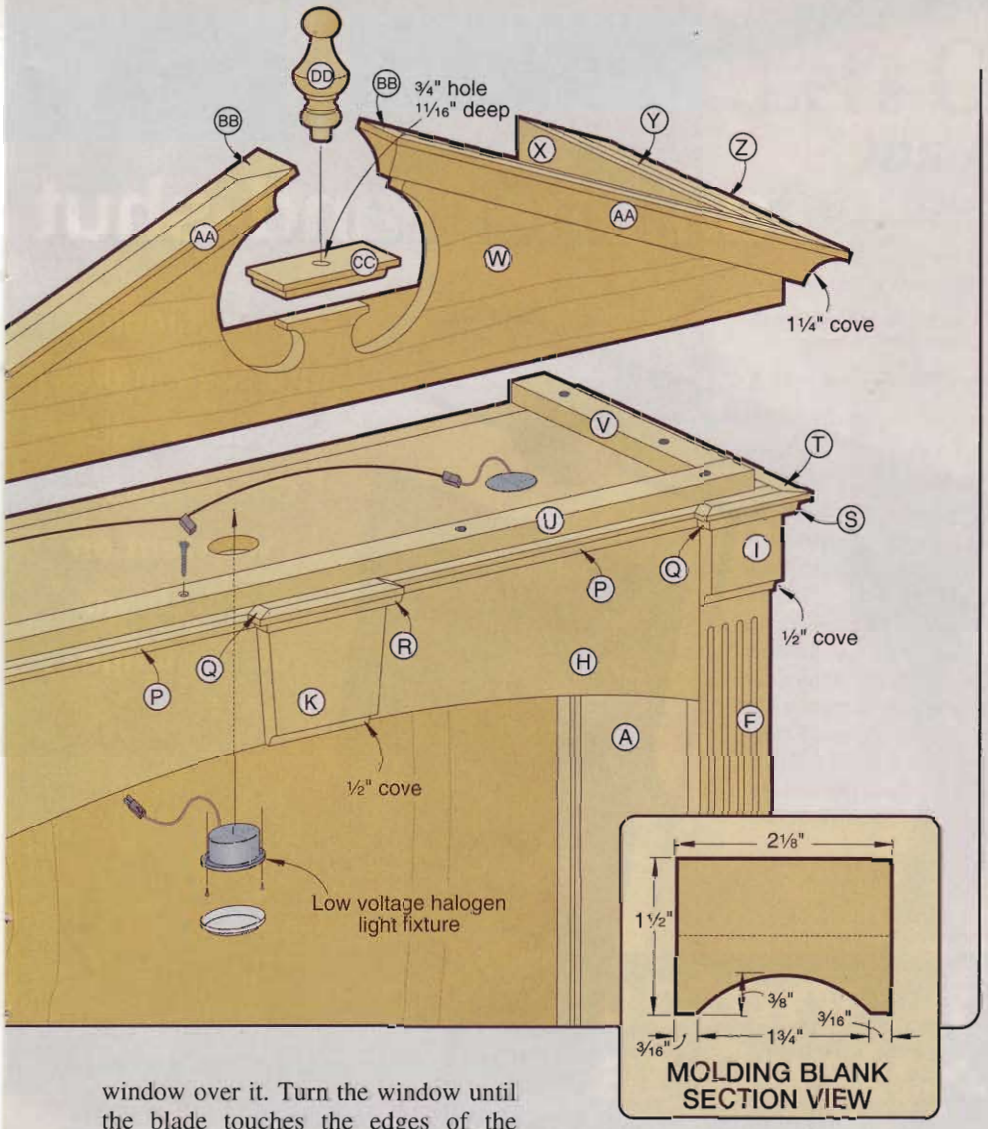


5 Cut a ¾×⅝×30" strip for the fillers (Y). Bevel-rip one edge, as shown on the Filler drawing. Trim the parts to length, then glue and clamp them in place, where shown on the Exploded View and Pediment drawings.

6 From ¾"-thick stock, laminate two 1½×2⅛×48" blanks for the coves Z, AA, BB. Cut a window in a piece of poster board, as shown in *Drawing 2*. Raise the saw blade to ⅜", and place the







window over it. Turn the window until the blade touches the edges of the cutout. Measure the angle, as shown.

7 Clamp a straightedge to your tablesaw, as shown in *Drawing 3*. Lower the blade to 1/16", and feed your blanks over it. Raise the blade in 1/16" increments until you reach the full 3/8" depth, as shown in the Molding Blank Section View drawing and *Photo B*. Sand away the saw marks.

8 Complete the cove molding by making the four cuts shown in *Drawings 4–7*. Mark lines along one of the backcuts to keep the profiles oriented when cutting the blanks into parts Z, AA, BB.

9 Using one piece of molding for each side of the pediment, miter-cut the side coves (Z), front coves (AA), and cove returns (BB) to length. Make your cuts so the wood grain is continuous and the marked backs are against the pediment front and sides. Glue and clamp the coves to the pediment.

10 Cut the finial base (CC) to size, and drill the centered hole for the finial's tenon. Rout the ogee profile on the bottom edges. Glue and clamp the finial base to the pediment, centered front-to-back and side-to-side. Glue and clamp the finial (DD) in place. See the Buying Guide for the source of our finial.

Note: *For those of you who wish to turn your own finial, laminate three pieces of ¾"-thick stock to form a 2¼×2¼×7" blank. See the pattern insert for a full-size pattern.*

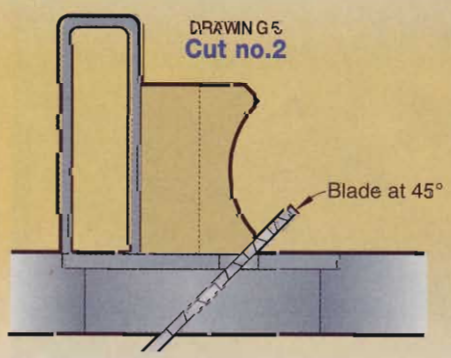
Apply the finish, and install the hardware

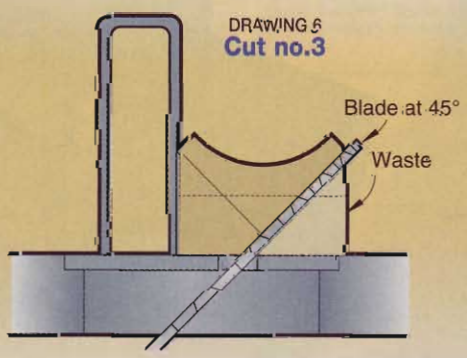
1 Finish-sand the project to 220 grit, and remove the sanding dust. If you wish to get an aged look quickly, apply a stain. (We used Minwax Gel Stain Cherrywood 607.) When the stain dries, apply two coats of a clear satin finish, sanding lightly between coats with 220-grit sandpaper.

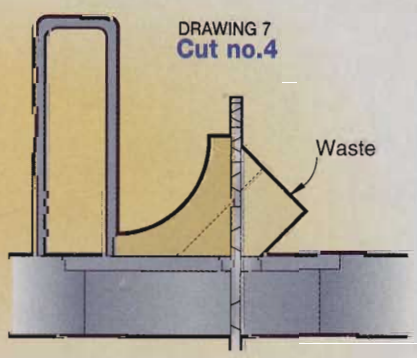
2 If you drilled your carcase for lights, install them according to the instructions. (We chose to mount the transformer out of sight on top of the cabinet behind the pediment.)

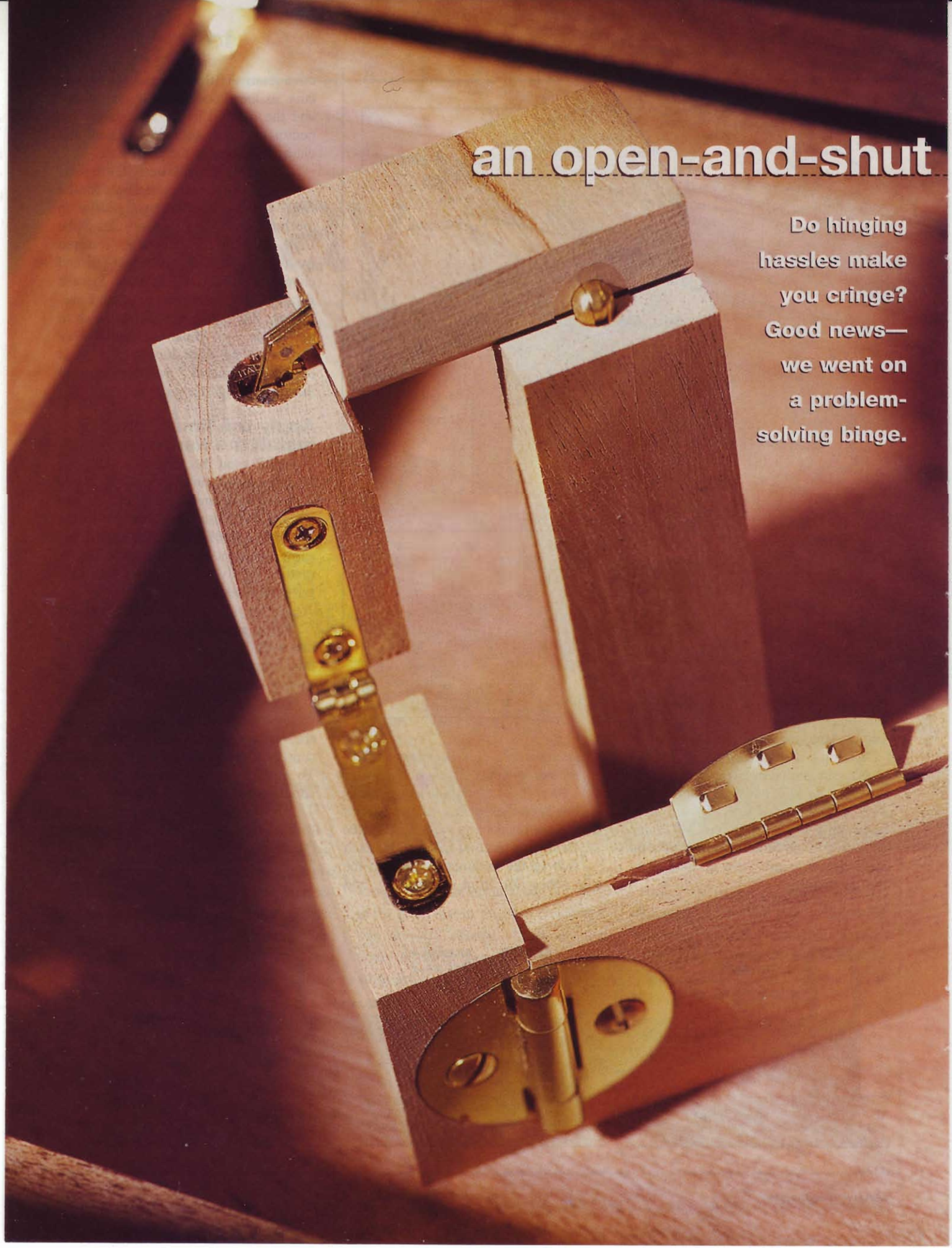
3 Attach the shelf standards, snap in the shelf supports, and install the shelves. See the Buying Guide for the source of our standards and supports. To cushion glass shelves, apply self-adhesive pads to the shelf supports.

Written by **Jan Hale Svec** with **Charles I. Hedlund**
Project design: **Doug Guyer**
Illustrations: **Roxanne LeMoine**; **Lorna Johnson**
Photographs: **Baldwin Photography**; **Wm. Hopkins**









an open-and-shut

Do hinging hassles make you cringe? Good news—we went on a problem-solving binge.

case for 5 handy hinges

You've built a great-looking little gift box, and now there's just one thing left to do: Put on the hinges. Sometimes, that last step can ruin your day. It's tough to find and install hinges that look great, fit precisely, and work perfectly.

We rounded up an assortment of five styles of box hinges and set out to make your task easier. We'll share the installation tips and techniques we discovered along the way, helping you get great results whether you're crafting a single box or a hundred.

Mini but mighty **cylinder** hinges

Let's start with the simplest hinge of the bunch. These little hinges are inexpensive, inobtrusive, and their motion relies on two cylinders with knuckles joined by a pin.

With the installation method shown here, they offer another advantage over most box hinges. Instead of requiring a separate stay, simple chamfers cut on the tablesaw will hold the open lid in an upright position.

Drill, then cut. Drilling for the hinges follows a procedure similar to that for the barrel hinges discussed on *page 60*. It calls for a drill-press table fitted with a fence, a stopblock, and a spacer. These hinges require a 5-mm hole. You have to carefully set the stopblock twice, as shown in *Drawing 1*, in order for the hinges to mate.

After you've drilled the holes, you need to cut a chamfer along the back edge of both the lid and base of the box. The tricky part is that the edge of the chamfer should slice right through the centerline of the holes, as seen in the photo at *right*. We cut holes along the edge of a scrap board, then fiddled with the position of our tablesaw's rip fence to sneak up on the right position.

Install the hinges. Mix up a small batch of epoxy adhesive, and use a toothpick or small dowel to wipe a tiny amount on the wall of each hole. Insert the hinges, as shown in the photo at *right*, positioning the hinge pins parallel with the back edge of the box. While the epoxy remains wet, gently close the box. The hinges should automatically complete the alignment. If you need to rotate a hinge, use a pair of needle-nose pliers. Immediately wipe up any epoxy squeeze-out.

These little hinges are all you need for a small box. They're also the most inexpensive ones we used, at 50 cents apiece.

Out-of-sight **barrel** hinges

When you want to focus all of the attention on the box itself, choose a hinge that does a disappearing act. With the lid closed, the barrel hinge hides completely inside the box. When you open the box, the hinge's interlocking leaves unfold gracefully with a high-tech look.

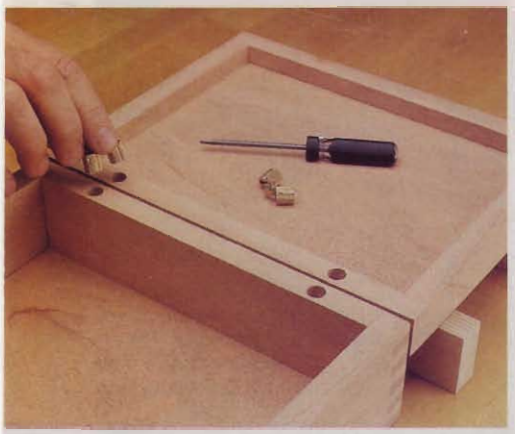
You do face a couple of tricky installation steps. Fortunately, each potential problem has an easy solution.

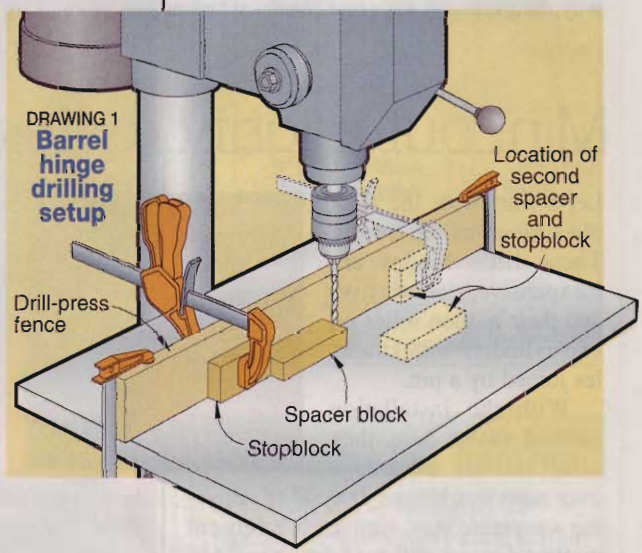
Set up your drill press. Chuck the correct brad-point bit into your drill press—the hinges we used called for a 14-mm bit—and clamp on a fence that centers the bit on the box's rear edge. Lower the bit to the drill-press table, then place a spacer to the left of the bit as shown in *Drawing 1*. We used a 2"-long spacer for our 10" box. Slide the stopblock against the spacer, and clamp it to the fence. Remove the spacer, but don't throw it away.

Make another spacer. Cut a board from scrap to hold the lid even with the base, as shown in the photo *below left*. The spacer allows you to use the same drilling depth for both the lid and the base.

After drilling the first set of holes, use the spacer from the first step to reposition the stopblock to the right of the drill bit. Complete the drilling, and insert the hinges as shown. They fit snugly into the holes, then you turn the adjustment screw to force them to expand and fit even more securely.

The spacer makes it easy to install the hinges. Gently swinging the lid shut will help square the hinges to the box. Then tighten the screw in each hinge to secure it in place.





Best hardware in a supporting role

Most box hinges don't have stops to hold the lid open. But adding a surface-mounted lid support is a quick and easy job. Attaching a chain is one method, but the links can get caught between the lid and base, marring the box. Commercial lid supports like the one shown in the photo at *right* eliminate that problem. Choose curved or straight, whichever you prefer.

Prop the lid open so it's just slightly past vertical. Then choose a mounting location about halfway along the lid side's width, and fasten the top end of the stay with a screw. Hold the stay against the box side to locate its other end. Drive the screws tightly enough to eliminate side play, but don't make them so tight that they restrict easy motion.

Sophisticated **side-rail** hinges

Here's a box hinge with undeniable appeal. The exposed brass knuckle provides a gleaming contrast to dark-colored hardwoods, such as walnut, cherry, or the mahogany that we used. The snug, mortised fit quietly asserts the quality of your craftsmanship. You don't have to confess how easy it was to install this hinge with a simple router-table setup.

Get ready to rout. The key to successfully installing this hinge is a straight router bit that matches the width of one leaf. Test this in a piece of scrap. For the hinge we chose, a 5/16"-diameter bit was a perfect mate. (See the Buying Guide box on *page 63* for details on both the hinge and bit.)

Mount the bit in your table-mounted router, and clamp on a fence to center the bit on the top edge of the box's side. Raise the bit so that the depth of cut matches the thickness of one leaf of the hinge. Then turn to your stopblock arrangement, as explained in the sidebar *below,* and also make the gauge. We chamfered the bottom edge of the stopblock so that accumulated sawdust wouldn't get in the way.

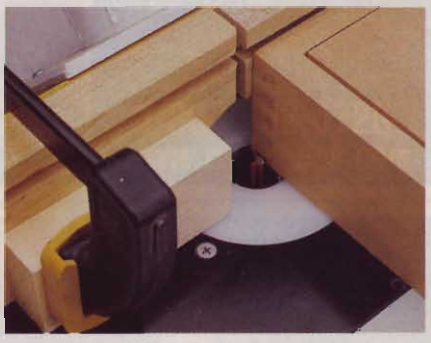
Be sure to position the stopblock for a mortise that lets the entire knuckle project past the box's rear edge. For the hinge we chose, the mortise is 1 5/16" long. Make a test cut in scrap to check the setup. Be careful not to set the depth of cut too deep. If you do, the back of the box will close before the front edges of the base and lid meet, resulting in a gap. Aim for a test cut that leaves the edge of the hinge leaf just proud of the surface.

Rout, then change the stopblock. Open the box and make pencil marks on the box sides where you'll cut the mortises. With the setup shown in the first photo *(right)*, you'll rout one side of the box's base, and the mortise in the lid on the opposite side.

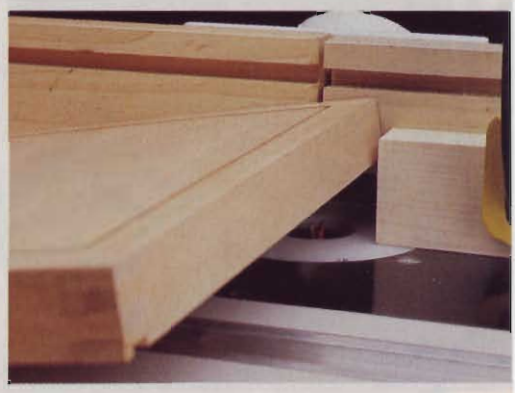
Hold each piece tightly against the fence, and move it across the router bit from right to left. After you've completed those cuts, you'll need to move the stopblock to the right side of the fence. Use your gauge to set the stopblock exactly the same distance from the bit as it was on the left side.

Complete the mortises. Cut the remaining mortises as shown at *right.* Lower the workpiece onto the spinning bit and slide it along the fence to the left. Don't try to make the cut in the other direction—you'll risk tearing out the wood.

Making sure that you mount both hinges in the same orientation, drive the screws, and check the action. If necessary, clamp or tape the box shut, and sand the sides to achieve a perfectly flush fit.



ABOVE: Cut the first set of mortises by sliding the box along the fence until the end hits the stopblock. Maintain firm contact against the fence as you back out of the cut.
BELOW: To make the second set of mortises, you'll lower each box part onto the running bit, and move the part to the left.



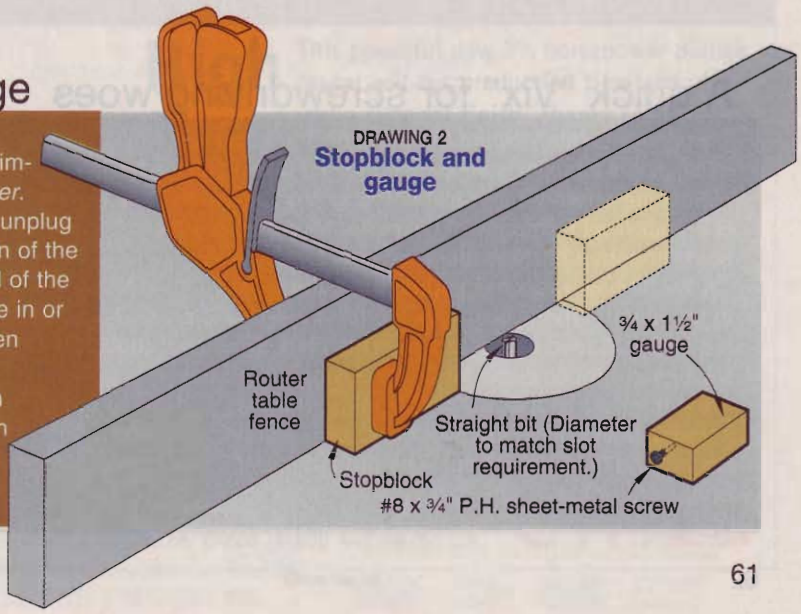
For accuracy, make this gauge

Set your stopblock on the left side of the bit to the length required for the hinge mortise. Also make a simple gauge like the one shown in the *lower right corner.*

After making one cut in the box and one in the lid, unplug the router, and rotate the bit so that a smooth portion of the shank touches the gauge. Mark that spot on the end of the bit with a felt-tip marker. Turn the screw in the gauge in or out, as needed, until the gauge slides snugly between the bit and stopblock.

Flip the gauge to the other side of the bit, then turn the router bit so that the mark again matches up with the end of the gauge. Complete the setup by re-clamping the stopblock.

DRAWING 2
Stopblock and gauge



Big and brassy **round** hinges

If you like the look of polished brass, this hinge gives you a lot to love. And, as if that weren't enough, it's also extremely easy to install. With a few tips that we discovered, you'll probably install a set of these hinges even faster than you can read about them.

Test the fit. Of course, we first checked the hinge's fit by drilling a test hole in a piece of scrapwood. When you go searching for drill bits, don't overlook metric sizes—many hinges are actually made to metric dimensions, and standard bits may offer a close but imperfect fit. For the hinges we used, we found that a 35-mm Forstner bit was just right.

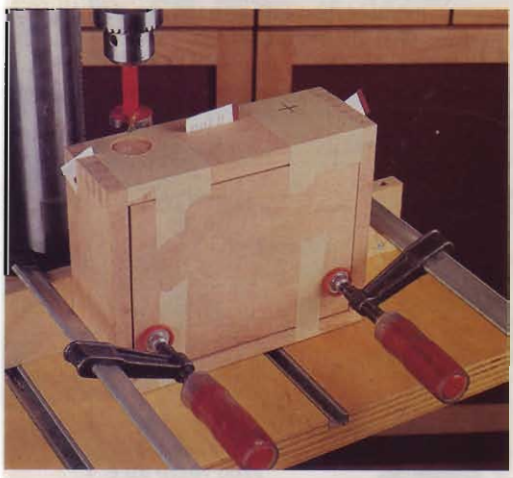
When you drill your test hole, carefully record the depth setting so you don't sink the hinge too deeply. Leaving the hinge's body slightly proud of the wood surface is better than overdrilling.

A tight lid is in the cards. Here's a little card trick to ensure that the box's lid stays tightly shut, even through repeated cycles of the wood's expansion and contraction due to moisture changes. Before we drilled the holes for the hinges, we inserted business cards between the lid and the box. Creating this slight clearance at the back will help make sure that the more visible seam at the box's front will close tightly.

After securing the box shut with strips of masking tape, we carefully marked the holes' centerpoints in the middle of the base/lid seam and 2" from the ends of our 10" box, and drilled the holes as in the photo at *left*. Although you might be tempted to save a little time by hand-holding the box, we found that a high drill-press fence added a lot of stability and gave us more security in hitting our marks.

Now, set the hinges. Press the hinge into the hole, and visually align the axis of the hinge pin with the base/lid seam. Drive the screws, and you're done. For a few tips on accurately placing the fasteners, see the sidebar *below*.

You can purchase a stop for the hinge that mounts atop the lower leaf to hold the lid in its opened position. The stop looks a bit chunky, but it works well. For a small box, you could install a stop on only one hinge, or add stops to both hinges. Use the longer screw that's furnished with the stop to handle its extra thickness.



With careful layout and a high drill-press fence, drilling for the round hinges is a safe and sure operation.

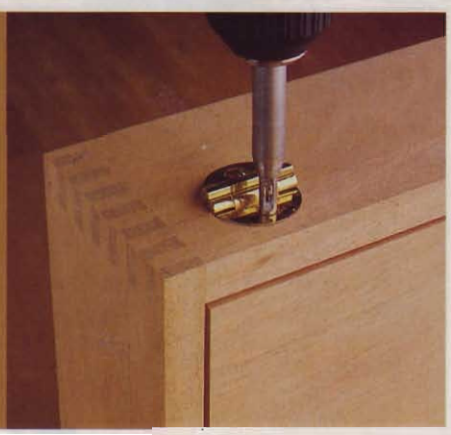
A quick "Vix" for screwdriving woes

Trying to accurately center the pilot hole for a screw in a hinge leaf can be an iffy affair. And if the pilot is off-center, the screw can pull the hinge out of alignment.

Eliminate errors with a self-centering "Vix" bit like the one shown here. The S.E. Vick Tool Company of Lakeville, Minn., makes the original version, but some imported bits use the Vix name, too.

A Vix bit has a tapered end on the outer sleeve that matches the countersink in the hinge. When you chuck the bit in a drill and press it against the hinge, the spring-loaded bit centers the pilot hole. Woodcraft (800/225-1153) carries Vix bits in various sizes for $8.99 apiece.

And here's a tip that will help you avoid the annoyance of broken brass screws. After drilling the pilot hole, drive a steel screw identical to the brass screw, and then back it out. The pre-cut threads you create reduce the stress on the softer brass screw.



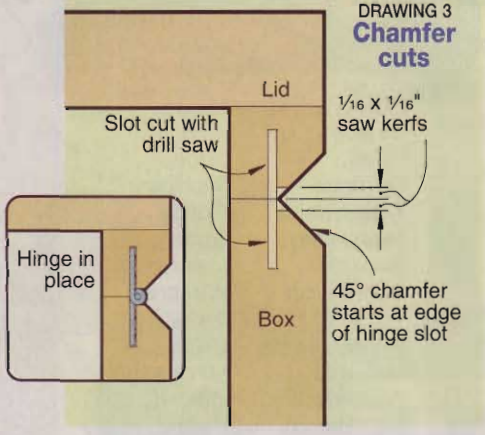
Barbed hinges for big batches

Barbed hinges are a favorite with wooodworkers who make large batches of boxes, especially pen-presentation boxes and small jewelry containers. They love the fact that barbs on the hinge make installation fast, with no glue or fasteners. Simply push the hinge leaves into the kerfs, and you're finished.

But home woodworkers who make only an occasional box face a paradox. You have to invest a significant amount of time in preparation before you can enjoy the speedy installation.

First, you need to build a fence jig. See the sidebar and the Barbed Hinge Jig drawing *below* for details.

And after you cut the hinge kerfs, you need to make two precision cuts at the tablesaw. Each of these cuts takes only a few seconds, but the setup can be time-consuming.



Measure for stops. When the fence jig is ready to go, measure for your stopblock positions. You'll use two positions to cut the kerfs. It's important to note that both positions are located to the left side of the blade. For our 8"-long box, we located the stopblocks 2" and 6" from the center of the blade.

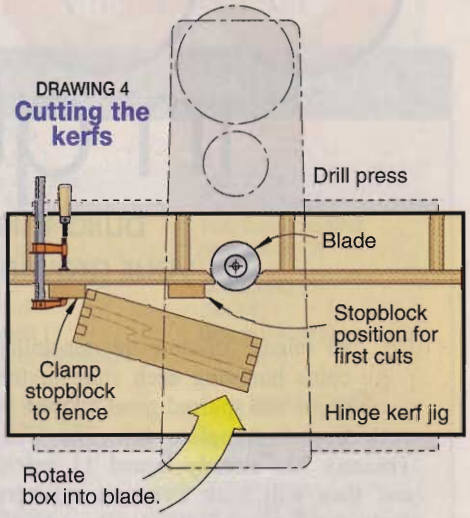
Once everything is ready, set the drill press at a low speed and cut the kerfs as shown in *Drawing 4,* centered in the stock. Press the box or lid firmly against the fence and stopblock as you cut.

Now turn to the tablesaw and refer to *Drawing 3.* Adjust your blade to 45°, and make the chamfer cuts along the back edge of the box and lid where shown. Reset the blade to 90°, and cut the saw kerfs. Doing this creates clearance for the hinge's knuckle.

Beware of the barbs. The barbs on the hinge's leaves make installation a one-way process. If you want to do a test fit, you'll need to destroy a hinge by flattening its barbs. Lay the hinge on a thick metal plate, and tap the barbs with a hammer until they're flush.

When you're ready to hinge your boxes, push one leaf of each hinge into the base, then position the lid. Pushing the lid into place completes the installation. It's so easy, you'll forget about the work you did to reach this point.

Written by **Bob Settich**
Photographs: **Baldwin Photography**
Illustrations: **Kim Downing; Lorna Johnson**



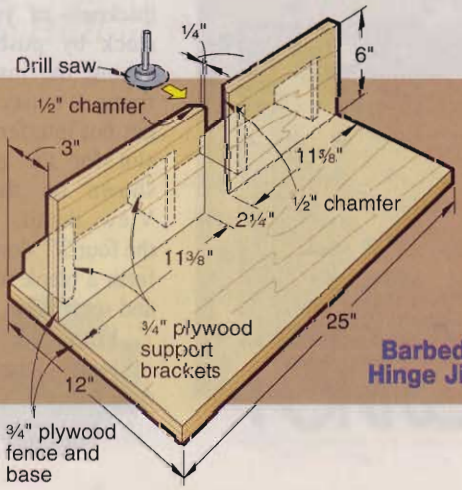
Buying guide

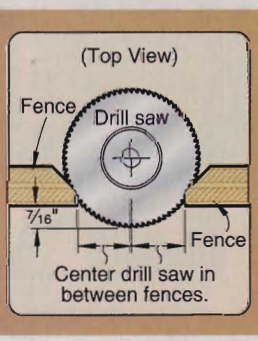
Side rail hinge, no. 126434, $22.99 per pair; round hinge, no. 129713, $25.99 per pair; barrel hinges, no. 27C11, $3.99 apiece; small cylinder hinges, no. 06R91, $4.99 for a bag of 10; barbed hinge, large, no. 141588, $1.59 per pair, small, no. 141589, $1.59 per pair; cutter, large, no. 141592, $19.99, small, no. 141591, $19.99; arbor, no. 141590, $19.99; all available from Woodcraft. Call 800/225-1153 to order, or log on to www.woodcraft.com.

Start with a safe, stable jig

We made our barbed hinge jig with ¾"-thick Baltic birch plywood. Make certain that the fence uprights align with each other and sit square to the base. For durability, assemble the jig with glue and screws.

Chuck the special arbor and saw assembly (see the Buying Guide, *above right*) into your drill press, and clamp the jig to the drill-press table so that the blade protrudes 7/16", as shown here in the detail drawing.





our country in quarters

build this framed display to house your growing state-quarter collection

The release of new quarter-dollar coins honoring each state in the union has spurred great interest in collecting a complete set. The U.S. Treasury has already issued 11 coins, and they will mint five new quarters each year, through 2008. See the sidebar, *right* for the schedule.

Our map gives you a great-looking way to display your collection. The clear plastic glazing slides out, allowing you to easily add new coins. We've made room for two coin sets, one each from the Philadelphia and Denver mints.

Start with a framed panel

1 Cut two ¼×22×32" pieces of oak plywood for the panel (A). Glue them together back-to-back. Lay the laminated panel on a flat surface, and weight it down until the glue dries. Finish-sand the panel and trim it to the size shown in the Bill of Materials.

2 Cut the frame sides (B) and frame top/bottom (C) to width, but about 1" longer than the sizes listed. Form the slot and the rabbet on your tablesaw, as shown in the Section View detail on the Exploded View drawing. Make sure your plastic glazing slides easily in the slot. Chuck a ¼" round-over bit in your table-mounted router, and rout the bead on the outside edges. Finish-sand the frame pieces.

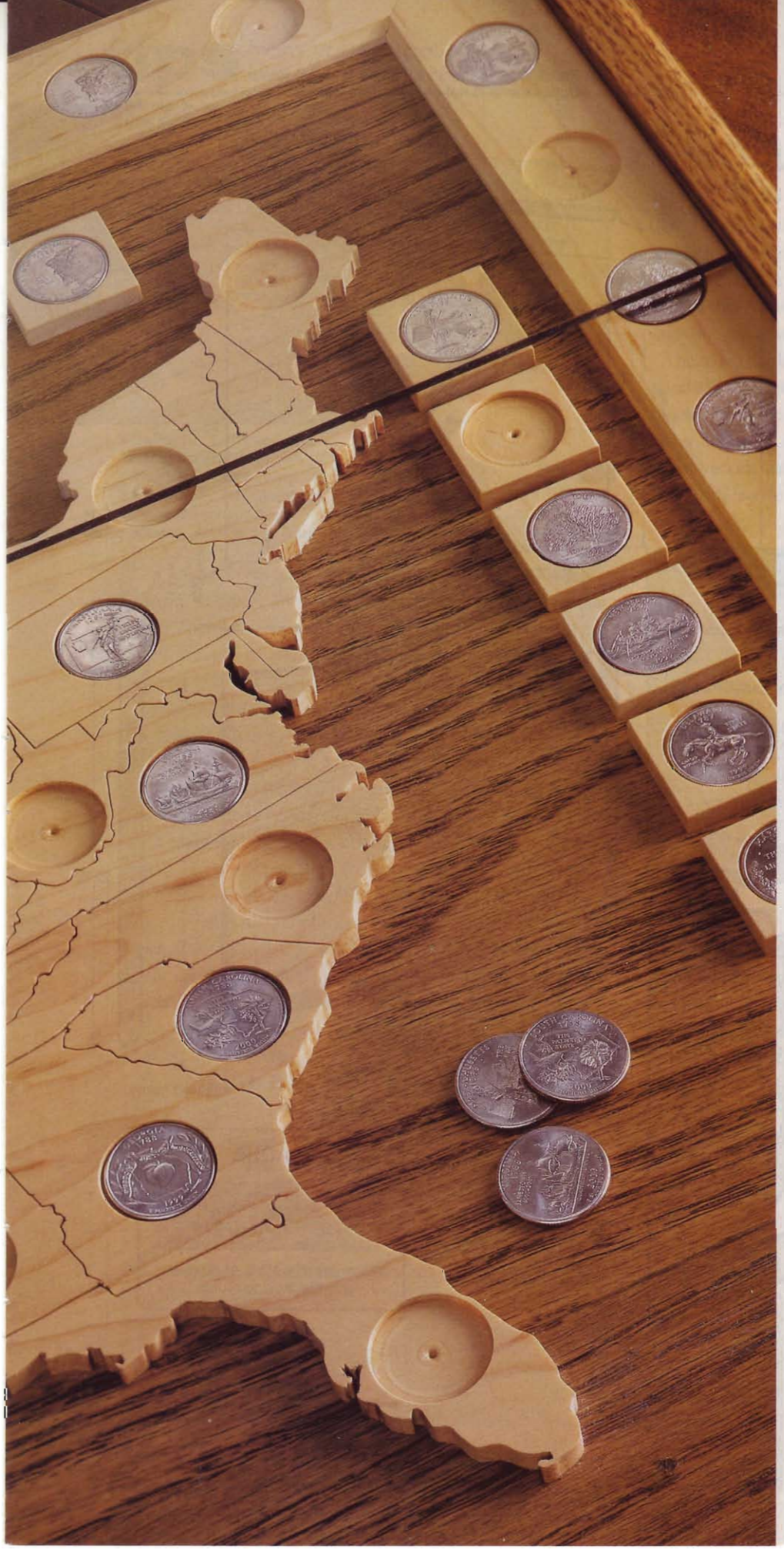
3 Miter the parts B, C to fit around the panel (A). Glue and clamp the frame bottom and two sides to the panel. Leave the top frame member loose. With the glue dry, stain the panel/frame assembly and the frame top. We used Minwax Gel Stain, Aged Oak #602.

4 Resaw into equal halves a ¾×4¼×60" piece of stock for the coin trim (D, E), and two ¾×4¼×27" pieces for the map blank (F). To ensure uniformity, plane all the resawn pieces to finished thickness at the same time. Check the thickness of your planed stock by pushing it up against the inside of the frame. It must come up to, but not interfere with, the slot for the glazing, as shown on the Section View detail. Edge-glue the four 27"-long pieces to form a blank for the map, and set it aside.

5 From the two 60"-long pieces, cut the coin trim (D, E) to width,

Scheduled release of state quarters

1999	2004
Delaware	Michigan
Pennsylvania	Florida
New Jersey	Texas
Georgia	Iowa
Connecticut	Wisconsin
2000	**2005**
Massachusetts	California
Maryland	Minnesota
South Carolina	Oregon
New Hampshire	Kansas
Virginia	West Virginia
2001	**2006**
New York	Nevada
North Carolina	Nebraska
Rhode Island	Colorado
Vermont	North Dakota
Kentucky	South Dakota
2002	**2007**
Tennessee	Montana
Ohio	Washington
Louisiana	Idaho
Indiana	Wyoming
Mississippi	Utah
2003	**2008**
Illinois	Oklahoma
Alabama	New Mexico
Maine	Arizona
Missouri	Alaska
Arkansas	Hawaii



shop tip If you have trouble removing the pattern, brush on paint thinner. The solvent soaks through the paper, and softens the adhesive.

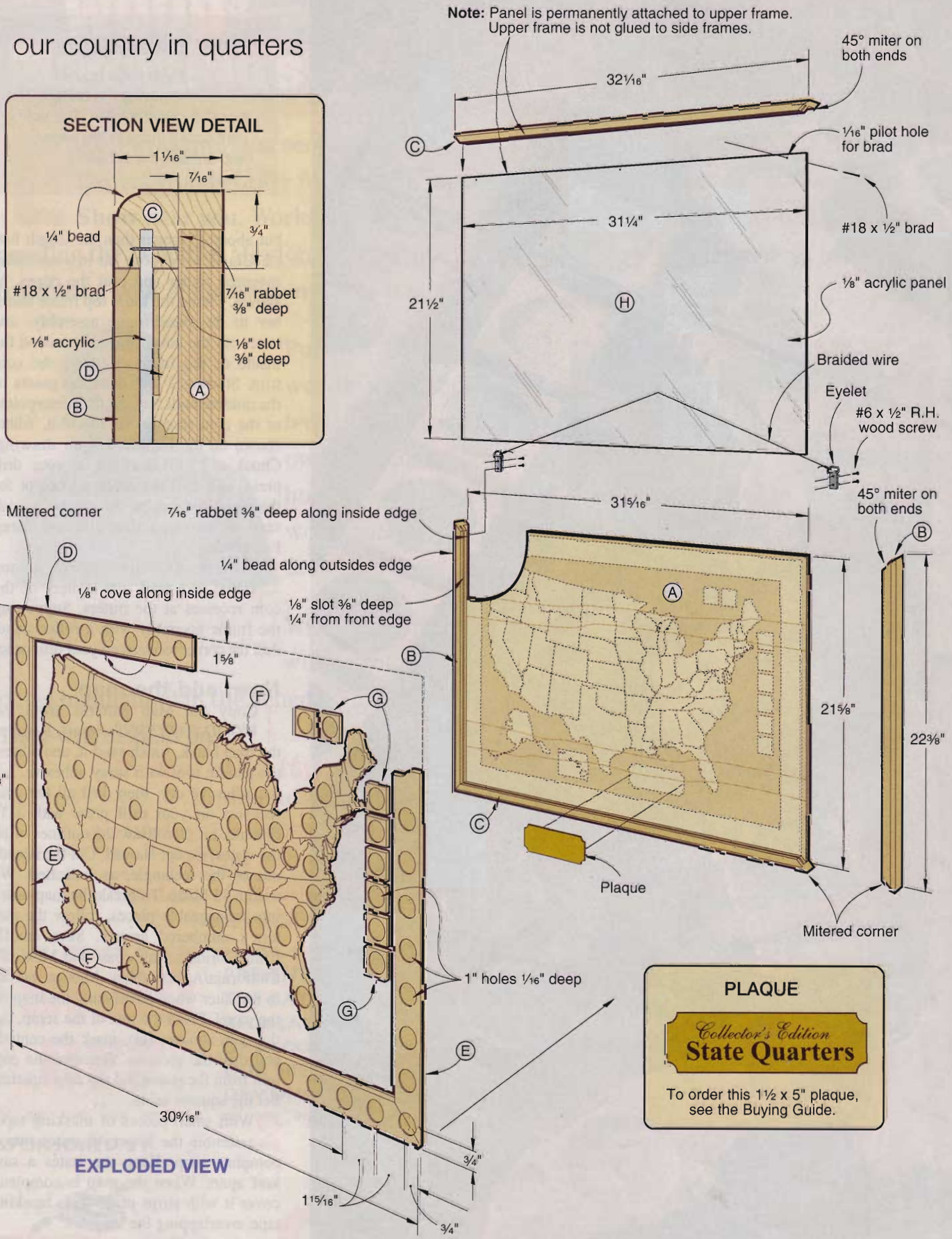
but about 1" longer than the length listed. Chuck a ⅛" cove bit in your table-mounted router and rout the edges, as shown. Clamp the loose top frame member to the panel/frame assembly, and miter-cut the coin trim to fit around the inside of the frame. Remove the coin trim. Starting 2 1/16" from the points of the mitered ends, lay out the centerpoints of the coin recesses on the trim, where shown on the Exploded View drawing. Chuck a 1" Forstner bit in your drill press, and drill the recesses, except for the ones that bridge the miters. Finish sand the coin trim, then glue and clamp it in place.

6 With the glue dry, remove the top frame and mark the centers of the coin recesses at the miters. Supporting the frame assembly with a roller stand, drill the corner recesses on your drill press.

Now, add the map

1 Copy the Map patterns from the *WOOD PATTERNS®* insert. Retrieve the map blank, finish sand it, and adhere the pattern to it with spray adhesive. Let the adhesive dry, then drill all the coin recesses on your drill press with a 1" Forstner bit. Scrollsaw the outlines of all the states, except Hawaii. Cut the islands out of the rectangle, as indicated. We used a #5 blade. To break the map down into manageable pieces, follow the pattern's numbered arrows. Save cutoffs from Florida's Gulf coast and Mexico's California/Arizona/New Mexico border to use later when positioning the map on the panel. From the rest of the scrap, cut the coin squares (G), mark the centers, and drill the recesses. Remove the pattern from the states and the coin squares. Set the squares aside.

2 With small pieces of masking tape, assemble the lower 48 states into a complete map. Keep the states a saw kerf apart. When the map is complete, cover it with strips of 2"-wide masking tape, overlapping the strips.



PLAQUE

Collector's Edition
State Quarters

To order this 1½ x 5" plaque, see the Buying Guide.

bill of materials

commemorative coin showcase

Part	FINISHED SIZE T	W	L	Matl.	Qty.
A* panel	7/16"	21 5/8"	31 5/16"	LP	1
B* frame sides	3/4"	1 1/16"	22 3/8"	O	2
C* frame top/bottom	3/4"	1 1/16"	32 1/16"	O	2
D* coin trim top/bottom	1/4"	1 5/8"	30 9/16"	M	2
E* coin trim sides	1/4"	1 5/8"	20 7/8"	M	2
F map blank	1/4"	17"	27"	EM	1
G coin squares	1/4"	1 1/4"	1 1/4"	M	8
H glazing	1/8"	21 1/2"	31 1/4"	A	1

* Parts initially cut oversize.

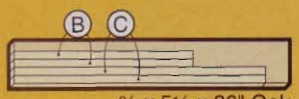
Materials Key: LP–laminated oak plywood, O–oak, M–maple, EM–edge-glued maple, A–acrylic.

Supplies: .096×30×36" clear acrylic sheet, #18×½" wire brads, #4×⅜" brass roundhead wood screws (2), #6×½" roundhead wood screws (4), brass-plated eyelets (2), braided mirror-hanging wire, glue, stain, finish.

Buying Guide

Plaque: Brass-finish plaque. Send $3.00 and a self-addressed, stamped business-size envelope to: WOOD magazine Coin Map, 1716 Locust Street, GA-310, Des Moines, IA 50309-3023.

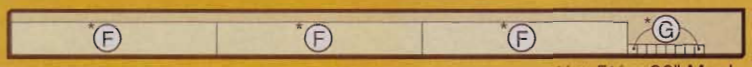
cutting diagram



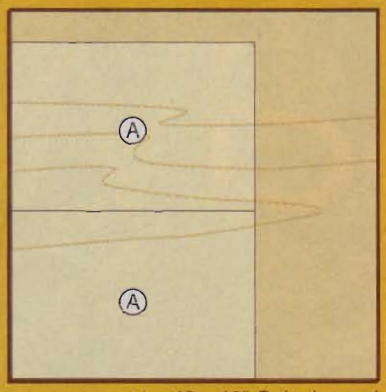
¾ x 5½ x 36" Oak

*Resaw and plane from ¾" stock.

¼ x 5½ x 96" Maple



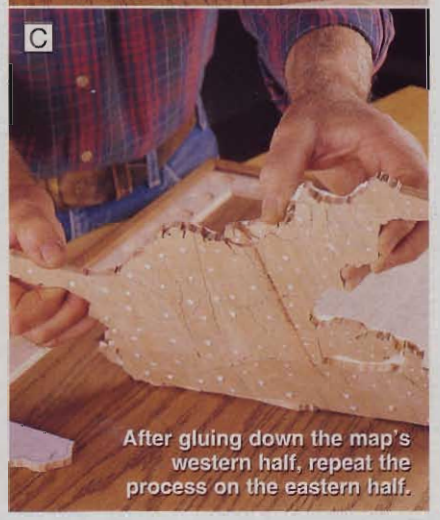
¼ x 5½ x 96" Maple



¼ x 48 x 48" Oak plywood

With the map in place, tape cut-off scraps to the panel to position it for gluing.

Leaving the map's eastern half in place, fold the western half over and apply glue.



After gluing down the map's western half, repeat the process on the eastern half.

3 Position the map on the framed panel with Washington ⅞" from the top trim, California ⅝" from the side trim, and Florida 1½" from the bottom trim. Use double-faced tape to adhere the pieces of the Gulf and Mexico in place, as shown in *Photo A*

4 Fold the western United States along the line partially formed by the Missouri River. Apply a few dots of white glue on the back of each state, as shown in *Photo B*. Lay the western states back down. Fold the eastern states over and repeat the process, as shown in *Photo C*. Check the alignment with the Gulf and Mexico, and press down firmly on all the states to make sure the glue makes contact with the panel. Glue Alaska, Hawaii, and the eight coin squares for the small eastern states in place, where shown on the Exploded View drawing.

Apply the finish and install the glazing

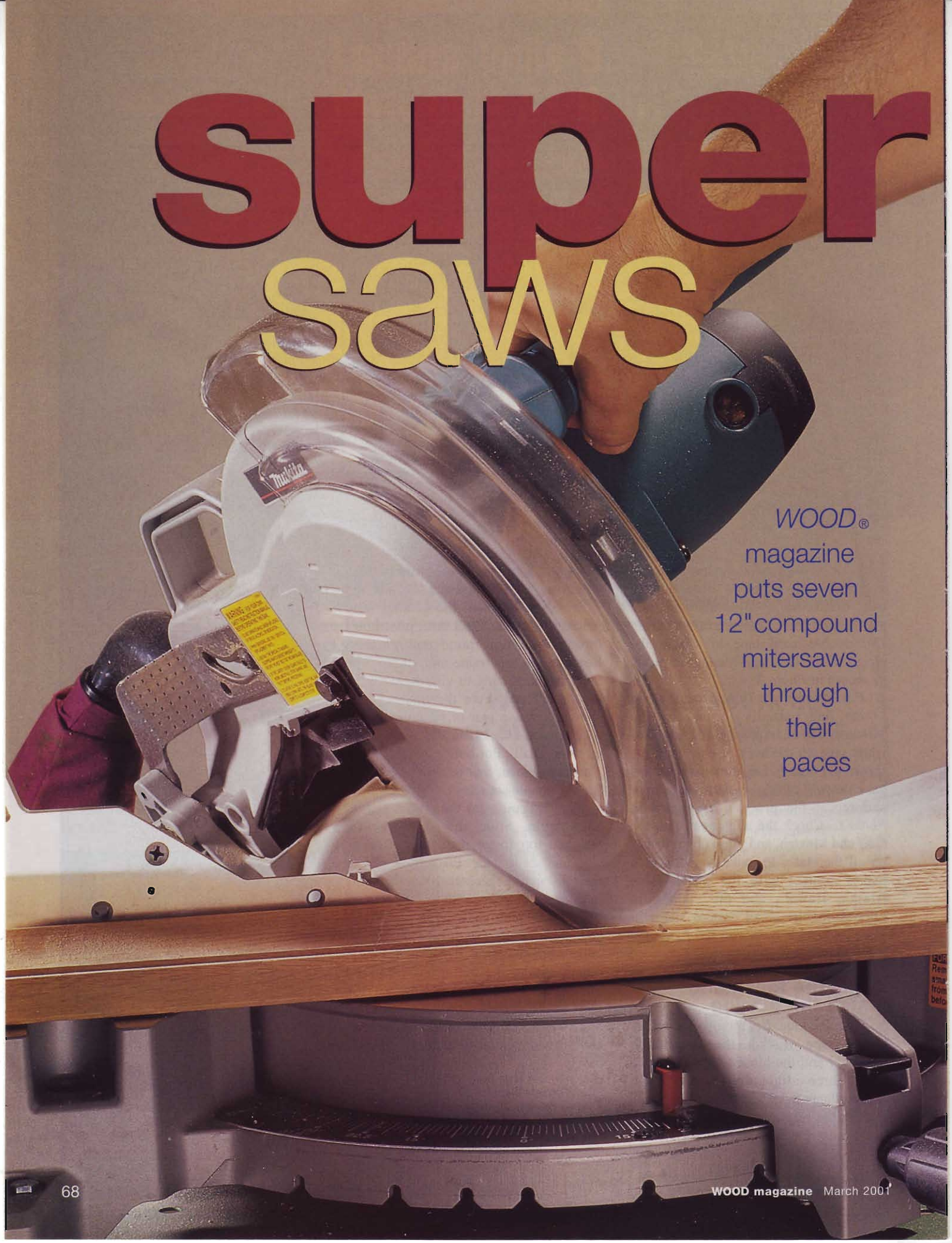
1 With the glue dry, remove the masking tape. Finish the map/frame assembly and the loose top frame piece with three light coats of satin polyurethane from a spray can.

2 Cut the acrylic glazing to size. Slide it into the slot in the map/frame assembly, and lay the assembly face down on your workbench. Fit the top frame in place, with the glazing fully seated in its slot. Drill brad pilot holes through the top frame and glazing. Remove the top frame and enlarge the holes in the glazing to 1/16". Replace the top frame, and drive the brads, where shown. Screw a pair of hanging eyelets to the frame's back, and attach the braided wire. Drill pilot holes and screw the plaque in place. See the Buying Guide for our plaque source.

3 To load coins, lay the display flat on a table. Slide the glazing with attached top frame member out of its slot, and set it aside. Place the coins in their respective recesses. Keep the coins in proper alignment with a small wad of Tac'N Stik removable adhesive (available at office supply stores). Display the coins from one mint on the map, and the others around the perimeter. Slide the glazing back in place, and hang the display on your wall. See the sidebar on *page 64* for the coins already available, and the schedule of future releases.

Written by **Jan Hale Svec** with **Erv Roberts**
Project Design: **James R. Downing**
Illustrations: **Kim Downing; Lorna Johnson**
Photographs: **Baldwin Photography; Wm. Hopkins**

super saws



WOOD® magazine puts seven 12" compound mitersaws through their paces

size

In the market for a compound miter-saw? These days, you can easily spend $500 for a sliding saw. Even a premium 10" compound mitersaw will set you back $250–$300—and it maxes out at 5½"-wide stock. If you need more cutting width, consider stepping up to a 12" compound mitersaw. It's like super-sizing your order at the fast-food place: You get an extra 2–2½" of cutting capacity for just a little more money.

Here's how we put these foot soldiers to the test

We started our exam of these seven mitersaws by checking and adjusting (if necessary) all of the out-of-the-box alignments and settings using a precision-ground plate. After a short motor break-in, we measured motor-shaft speed with a phototachometer, and noise levels with a sound meter.

To check capacity, cut quality, and accuracy, we subjected each saw to a series of test cuts at various bevel and miter angles, cutting pine, oak, and several composite trim materials. To eliminate any performance issues that may have been caused by using the supplied blade, we then replaced it with a high-quality, 80-tooth crosscut blade and repeated the cutting tests.

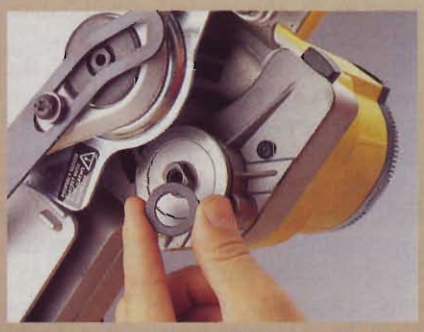
While running each saw through its paces, we evaluated ease of operation, visibility and readability of scales, safety, portability, dust collection, fence design, and accessories. Finally, we disassembled and inspected the internal parts of each tool. We were pleased to find high-quality bearings and components being used on every saw.

Saw performance starts with the drive train

All of the models we reviewed for this article offer 15-amp motors fitted with electric brakes to slow blade rotation quickly, and externally replaceable carbon brushes. Only Makita's LS1220 came equipped with soft-start circuitry. This helps minimize the head movement caused by motor torque as the motor starts, and it made a noticeable difference. We were able to start this saw with the blade close to the workpiece without fear of it lurching down into the material.

To accept the 1" arbor bore on 12" blades, Ridgid uses a solid 1" arbor—no small machining task. The rest of the models in our test use a ⅝" arbor shaft that they convert to 1" with either a shouldered arbor flange, or an arbor flange and a removable spacer-washer in the case of DeWalt and Makita. In a pinch, you could remove the washer from either saw and use a 10"-diameter blade on the now ⅝" arbor. Using this method, the Makita LS1220 cut completely through a 6½"-wide workpiece, while the DeWalt DW705 left a small, toothpick-sized bit of stock connecting the "keeper" and waste pieces where the blade couldn't reach.

Gearing reduces the universal motors' 15,000 revolutions per minute (rpm) to an arbor speed between 3,000 and 4,000 rpm. These gears rest in an aluminum housing bolted to the motor and carriage



DeWalt (shown) and Makita use a spacer washer to center the blade's 1" arbor hole on their ⅝" arbor.

FAST FACTS

- Unlike a 10" mitersaw, a 12" model gives you the capability to bevel-cut narrow stock, such as trim and base molding, on edge and against the fence.
- For cabinet-quality cuts, replace the factory-supplied blade with a premium 80-tooth crosscut blade.
- Outside the workshop, 12" mitersaws easily crosscut 4×4 and 2×8 dimensional lumber—even 4×6 timbers at 0° miter and bevel—for DIY projects.

arm, with the gear shaft serving as the blade arbor.

Makita had the slowest arbor speed (3,159 rpm), and Craftsman the fastest (3,997 rpm). The higher speed cut faster, but other than that, we observed no advantage in cut quality.

As you might imagine, universal motors turning at 15,000 rpm create considerable noise. Tested under no load, most units logged levels in the 105–106 decibel (dB) range, when measured from 36" away. The Craftsman was the loudest at 111 dB; the Makita, a comparative whisper at 102 dB. Typically these saws run for short intervals so noise here isn't as critical as on a tablesaw, but you should still wear hearing protection when using them.

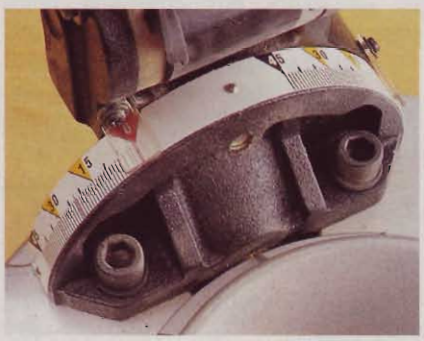
Making the cut through thick and thin

All of the saws we tested can miter-cut at least 45° both left and right, plus a bit beyond for those occasional cuts when an extra degree or two is needed to make a perfect fit. (Larger angles will reduce the capacity slightly.)

Each saw also bevel-cuts (that is, the head tilts to the left) at any angle from 0–45°. The Ridgid MS1250 is the only machine in the test that provides a -3° to +50° bevel range without having to reset the 0° and 45° bevel stops. Instead, the saw employs a unique stop system that engages in one position for 0° and 45° only; a second position for those angles plus the 33.9° crown-molding bevel angle; and a third position that defeats the stops completely. The Bosch 3912 also has a 33.9° bevel stop.

Typically, the bevel scales on most saws challenged our patience (and our tester's tired eyes). Small, condensed, and located at the back of the saw, most are difficult to read and to set accurately. Craftsman engineers helped by putting a scale on both the left and right side of the support arm, and using a hairline cursor, as shown in the photo *above middle*. Unfortunately, dust collected underneath the cursor's bezel so it still was hard to clean and read. In fact, many of the scales quickly became obscured with sawdust, but those on the Delta, Makita, and Porter-Cable were the easiest to clean, read, and use.

The Cutting Capacity columns of the chart on *page 72* show the thickest and widest piece you can cut on each saw at four common bevel- and miter-angle combinations. Stock thickness and width have an inverse relationship on these cutting machines: As you increase the thickness, you lessen the maximum width you can cut, and vice-versa.



Above: Bosch's left extension table slides out for support and in for transport. The hex wrench stores on the base.

Left: Large markings and a hairline cursor make Craftsman's dual bevel scales easy to read from either side of the saw—until the dust flies.

While we're on the subject of size, with proper external support, you can cut material as lengthy as your work space will allow. But heavy workpieces or those longer than about 36" require more support than these mitersaws can provide on their own.

The tables on most of the saws offer a fair amount of support all by themselves. Each model provides 11–12" of tabletop both left and right of the blade, and most offer some type of left-side extension. The Delta and Porter-Cable saws provide the most support with extensions that reach 17" to the left. Bosch's unique extension (shown at *top*) slides out as needed to increase left-of-blade support to 16", then stows for transport.

If they worked properly, Craftsman's formed-steel supports would stretch nearly 20" to either side of the blade. Unfortunately, we couldn't make the rods on our unit level with the tabletop (see photo *below*), so they didn't provide any real stock support. Makita and DeWalt offer workpiece supports only as an accessory.

The turntable can make or break a saw

A mitersaw's turntable rotates to present the saw blade at the desired miter angle to the fence. Each saw in our test had nine pre-set stops, called detents, built in. These detents allow you to quickly set miters at the mostly commonly used angles—15°, 22.5°, 31.6° (for crown molding), 45° left and right, and 0° (perpendicular to the fence).

Bosch, Craftsman, and DeWalt use the tried and true lock-knob and finger-lift

Craftsman's steel support rods would offer the widest support in the test—if they were level with the table.

detent-lock releases—loosen the knob slightly, then lift the release with your index finger—and these were easy to use. The Bosch release works well, but we found it easy to overtighten the knob, which changed the alignment of the turntable on our unit.

Ridgid and Makita use a push-down detent release. However, because of their location (straddling the miter-lock knob), we find the thumb-operated, push-down lock releases more awkward to use than finger-lift versions.

The Delta and Porter-Cable mitersaws, which are otherwise remarkably similar, differ in their detent-locking systems. Delta uses a spring-loaded ball bearing detent setup combined with a lever that unlocks instantly with a squeeze. On our unit, though, the ball didn't drop positively into the detents, and we had to gently rock the turntable back and forth to get a solid engagement. The lever has to be continually squeezed while doing this. The Porter-Cable saw uses a push-down lock release. The knob locks and unlocks with just one-quarter turn. You can't overtighten the knob, but on our unit it required more force to operate.

When rotating the turntable, friction between the table and frame can affect the ease of making accurate settings. Jumping to a detent wasn't a problem but we found it hard to hit a specific degree mark on some saws. For example, the Delta, Porter-Cable, and Ridgid saws have generally smooth-operating turntables, but they sometimes became jerky and hard to set precisely, requiring both hands to position them. By comparison, we found we could accurately set the Bosch, Craftsman, and DeWalt saws anywhere on the scale with one hand. We liked DeWalt's operation best.

As for the miter scales themselves, we were pleasantly surprised with their readability and accuracy. Scales on the Delta 36-235 and Makita LS1220 can be recalibrated if necessary; on the other saws, the scales are cast into the base.

You don't need to read between the lines to get to fraction-of-a-degree accuracy because several saws incorporate a vernier scale, such as the one shown *above middle*. Move the center cursor line to the nearest whole degree, then use the fractional cursors on the bezel to set to the nearest ¼° (Bosch, DeWalt, and Ridgid) or ½° (Delta and Porter-Cable). We found this feature helpful for tweaking the miter angle when you have to compensate for an out-of-square joint.

One more note about turntables: In the center of each saw's turntable is an insert to keep sawdust and small cutoffs from falling into and jamming the cutting throat. During use, and especially when beveling, the kerf gets widened and close blade clearance is lost. Makita, unlike the others, uses a two-piece insert, shown *below right*. Adjust both sides to suit the task—close for near-zero-clearance on delicate cuts, widened for bevel or general cutting.

Above: Vernier scales on most saws give you ½° or ¼° accuracy. The angle shown here is 7¼°.

Right: Makita's two-piece insert allows you to narrow the blade opening to reduce tearout or open it for bevel cuts.

Fence fashions: High and mighty

Mitersaw fence design provides the manufacturers with a challenge: It must be high enough to support tall stock, but open enough to not interfere when laying the blade over for beveling. Most saws, except the Craftsman 21222 and Makita LS1220, use a sliding left subfence that sets close to the blade for support on 0°-bevel cuts, then shifts to the left to clear the tilted blade. Makita uses a hinged subfence that flips up and out of the way when making a bevel-cut (same effect, different method). Craftsman simply leaves the left fence gaping for all bevel angles.

We liked the tall fences on the Delta and Porter-Cable units. Bosch engraves a scale in ⅛" increments onto the right fence of the 3912—a nice touch for crosscutting short pieces without having to measure and mark. They also finish the fence face with a coarse cross-grind that helps keep workpieces from sliding around during the cut.

For attaching a subfence, all of the saws in our test come pre-drilled. Whenever possible, we recommend using such a subfence, especially on saws with shorter fences, such as the Craftsman and Makita. Although a subfence reduces cutting capacity slightly, it creates a zero-clearance backer, and will give you less backside tearout on your cuts. We also find one helpful for aligning stock when making compound cuts because it shows the exact path of the blade.

More features to consider

•***Blade guards.*** The guards on the Craftsman, Makita, and Ridgid mitersaws open quickly once the saw head begins its downward plunge. Those on the Bosch, Delta, DeWalt, and Porter-Cable saws stay a little closer to the workpiece, which exposes fewer saw teeth to fingers. These manufacturers mounted a small rubber wheel on the front left corner of their guards to keep the slower-opening guards from hanging up on your workpiece in bevel cuts.

•***Blade changing.*** All of the saws have an arbor lock to ease blade-changing. But only the Delta, Porter-Cable, and Ridgid models hold the blade guard in its retracted position while changing blades. That's a big plus, because it keeps your hands free for dealing with the arbor nut and blades. (On the other models, we taped the guards open with masking tape to ease the process.)

Although you probably won't change blades that often, it's nice to be able to find the wrench when you do. All of the

saws in our test, except for the Craftsman, provided on-board wrench storage. Besides the arbor wrench, the Bosch, Craftsman, and DeWalt saws require a screwdriver for the process.

•Blades and cut quality. The saws came fitted with 32- or 40-carbide-tooth, thin-kerf blades. Thin-kerf blades seem to have become the norm on mitersaws, even though there's a trade off in cut quality. (They remove less material than a full-kerf blade, thus making it seem that the saw motors have more power.) Only DeWalt supplied a negative hook-angle blade, which we prefer for this kind of saw.

Although we observed some chipping and tearout, the factory-supplied blades did surprisingly well cutting hardwoods and some molding stock. To get delicate, cabinet-grade cuts, you'll want to upgrade to a high-quality blade with a zero- or negative-hook angle, and at least 60 carbide teeth.

•Handles and switches. The industry appears to have settled on the horizontal D-shaped handle with integrated on/off trigger-type switches. We like these handles—they're comfortable, easy to use, and we think safer to operate than other designs. We didn't find any one superior over the other, but combined with switch variations, some differences did surface.

Two-stage switches require pressing a safety switch, then squeezing the power switch. This works well if you're right-handed but can be awkward for lefties, or for that occasional left-end cut. To counter this, Bosch provides two separate safety buttons—one positioned for left-hand operation, one for right hand (see photo, *below left*). Also, safety switches on the Craftsman, Makita, and Ridgid operate easily with the left or right hand. Craftsman's safety switch folds over the entire front of the handle, and we found it uncomfortable. Bryan Whiffen at Craftsman told us that the switch will be changed in future models to make it more user-friendly. Delta, DeWalt, and Porter-Cable use single-stage trigger switches so there are no safety buttons to deal with.

Bosch's dual safety switches can be triggered with the thumb of either your right or left hand.

•Portability. Mitersaws in general are awkward to tote around, and those weighing more than 45 pounds can become a load if carried for a distance. Depending on your definition of "portable," all saws in the test passed—some more easily than others.

The new carrying handle designed into the saws (on all but Delta) definitely helps in dead-lifting the machines from the floor, and for carrying them short distances. Saws with longer tables and extensions tend to be more troublesome, but not impossible, to handle.

•Dust collection. These saws spew out clouds of sawdust, but don't collect much of it. All manufacturers except DeWalt optimistically included small cloth bags for this—DeWalt offers one as an accessory. That said, the Delta and Porter-Cable do collect more of the sawdust than the others. They've mounted a rubber tube in the dust stream that helps collect and direct the waste toward the bag. Attaching a shop vacuum in place of the bag improved dust collection a bit.

•Hold-down clamps. Many operators simply handhold a workpiece on the table and never use a clamp or hold-down, but we prefer not having to put our hands anywhere near the saw blade—especially when making compound cuts. Besides substituting as a pair of hands, hold-down clamps improve cut quality because they keep workpieces from creeping on the table while being sawed. Bosch, Craftsman,

MANUFACTURER/IMPORTER	MODEL	ARBOR SPEED (RPM, NO LOAD) (1)	BEVEL STOPS (DEGREES)	FRONT-TO-REAR CLEARANCE (INCHES) (2)	BASE DIMENSIONS (L x W, INCHES)	STOCK SUPPORT (INCHES)		FENCE HEIGHT, INCHES (LEFT, RIGHT)	MAXIMUM MITER ANGLE (DEGREES LEFT, DEGREES RIGHT)	BEVEL RANGE (DEGREES) (4)	CUTTING
						LEFT OF BLADE (3)	RIGHT OF BLADE (3)				0° MITER, 0° BEVEL
BOSCH	3912	3,865	0, 33.9, 45	27	14 1/4 x 25 1/4	16	12	5 1/8, 4	52, 53	0-45°	2 3/4 x 7 3/4
CRAFTSMAN	21222	3,997	0, 45	25 3/4	13 1/2 x 23	19 5/8	19 5/8	4, 3 3/4	46, 46	0-45°	2 3/4 x 7 1/2
DELTA	36-235	3,327	0, 45	36	18 1/2 x 24	18	11	5, 2 1/2	49, 50	0-45°	2 3/8 x 7 3/4
DeWALT	DW705	3,987	0, 45	24 3/4	14 1/2 x 23	11	11	5, 4	48, 48	0-45°	2 1/2 x 7 3/4
MAKITA	LS1220	3,159	0, 45	32	13 3/4 x 23 1/2	11 3/8	11 3/8	4 1/2, 4 3/16	50, 50	0-45°	2 3/8 x 7 7/8
PORTER-CABLE	3802	3,426	0, 45	35 3/4	18 1/2 x 24	18	11	5, 3 5/16	49, 49	0-45°	2 3/8 x 7 3/4
RIDGID	MS1250	3,420	0, 33.9, 45	27 3/4	14 1/2 x 25	15 3/8	12 3/8	5 1/8, 4 1/8	48, 47	-3-50	2 3/4 x 7 3/4

NOTES:

1. Measured with a phototachometer
2. Total length of saw, measured from miter knob at front to dust bag (if so equipped) at rear.
3. Including extensions, where so equipped.
4. (*) Angles above 45° or below 0° require resetting stops.
5. Plus or minus 1/8" for fence and blade variations. To determine these capacities, we first found the maximum width each saw could cut. Then we found the maximum thickness the saw could cut at that width.
6. E Excellent, G Good, F Fair, P Poor

MAKING THE CUT: HOW SEVEN 12" MITERSAWS COMPARE

	CAPACITY (T x W, INCHES) (5)			PERFORMANCE RATINGS (6)																							
						JOINT QUALITY (7)																					
	45° MITER, 0° BEVEL	0° MITER, 45° BEVEL	45° MITER, 45° BEVEL	QUALITY OF INCLUDED BLADE	0° MITER, 0° BEVEL	45° MITER, 0° BEVEL	0° MITER, 45° BEVEL	45° MITER, 45° BEVEL	CROWN MOLDING SETTINGS	MITER SCALE READABILITY	BEVEL SCALE READABILITY	MITER DETENTS	MITER LOCK	TURNTABLE POSITIONING	BEVEL LOCK	TABLE INSERT	DUST COLLECTION	BLADE CHANGING	HANDLES/SWITCHES	PORTABILITY	CORD LENGTH (FEET)	WARRANTY (8)	COUNTRY OF ASSEMBLY (9)	WEIGHT, POUNDS	SELLING PRICE (10)	COMMENTS
	2 7/8 x 5 1/2	1 1/2 x 7 3/4	2 x 5 5/8	G	G	G	E	G	G	F	F	E	G	E	G	G	F	G	G	F	7 1/2	1 yr.	TAI	41	$320	Large table and outstanding fence. Power-switch safety trigger works with left or right hand.
	2 1/2 x 5 1/4	1 1/2 x 7 3/4	1 1/2 x 5 1/4	F	E	G	G	G	G	G	G	E	E	E	G	G	P	G	F	F	8	1 yr.	TAI	41	$299	Easy-to-read dual bevel scales. Left fence provides little support for tall 90° miter cuts.
	2 3/8 x 5 1/2	1 1/2 x 7 3/4	1 1/2 x 5 1/2	G	G	E	E	E	E	G	G	F	G	G	G	G	E	E	E	F	9	2 yrs.	TAI	50	$299	Large table with tall fence. Best dust collection in the test. Miter detents are a little soft.
	2 1/2 x 5 1/2	1 1/2 x 7 3/4	1 1/2 x 5 1/2	G	E	E	G	E	E	E	G	E	E	E	G	F	N/A	G	E	G	7	1 yr.	USA	40	$340	Smooth-gliding turntable makes it easy to set miter angles with one hand. No dust bag.
	2 3/8 x 5 1/2	1 1/2 x 7 3/4	1 1/2 x 5 1/2	G	E	E	E	E	E	E	G	E	E	G	E	E	G	F	E	E	7	1 yr.	USA	37.5	$360	Lightweight and portable, with the only soft-start motor in the test. One of our favorites.
	2 3/8 x 5 1/2	1 1/2 x 7 3/4	1 1/2 x 5 1/2	G	G	E	E	E	E	E	G	E	E	G	G	G	E	E	E	F	10	1 yr.	TAI	55.4	$350	Similar to Delta 36-235, but with improved detents and twist-lock miter lock.
	2 3/4 x 5 1/2	1 7/8 x 7 3/4	1 3/8 x 5 1/2	G	G	E	E	G	E	F	F	E	E	G	G	G	G	E	G	F	10	LIFE*	TAI	49	$300	Large table and fence. Best bevel system with expanded range and crown-molding stop.

7. Quality of mating cuts made in 3/4 x 4 1/2" stock at listed miter and bevel angles. All joints cut with a premium quality, 80-tooth blade.
8. (*) Lifetime warranty against factory defects.
9. (USA) United States (TAI) Taiwan
10. All prices current at time of article's production.

For more information, contact:

S-B Power Tool Co. (Bosch)
877/267-2499
www.boschtools.com

Craftsman
Visit your local Sears store.
www.sears.com/craftsman

Delta
800/438-2486
www.deltamachinery.com

DeWalt
800/433-9258
www.dewalt.com

Makita
800/462-5482
www.makitatools.com

Porter-Cable
800/487-8665
www.porter-cable.com

Ridgid
800/474-3443
www.ridgidwoodworking.com


Bosch 3912


Craftsman 21222


Delta 36-235


Dewalt DW705


Makita LS1220


Porter-Cable 3802


Ridgid MS1250

Delta, Porter-Cable, and Ridgid provide a hold-down clamp; DeWalt and Makita offer them as optional accessories.

The quick-release clamps on the Delta, Porter-Cable, and Ridgid saws work well. The Delta/Porter-Cable lever-type clamps apply pressure from the top, readily adjust for different stock thickness, and can be positioned in different locations around the table, thus keeping out of the way of the blade. Ridgid's screw-type clamp squeezes the stock from the side and against the fence with plenty of pressure to hold a workpiece firmly. Without a quick-adjust, hold-down clamps on the Bosch and Craftsman saws must be tediously turned to different thicknesses.

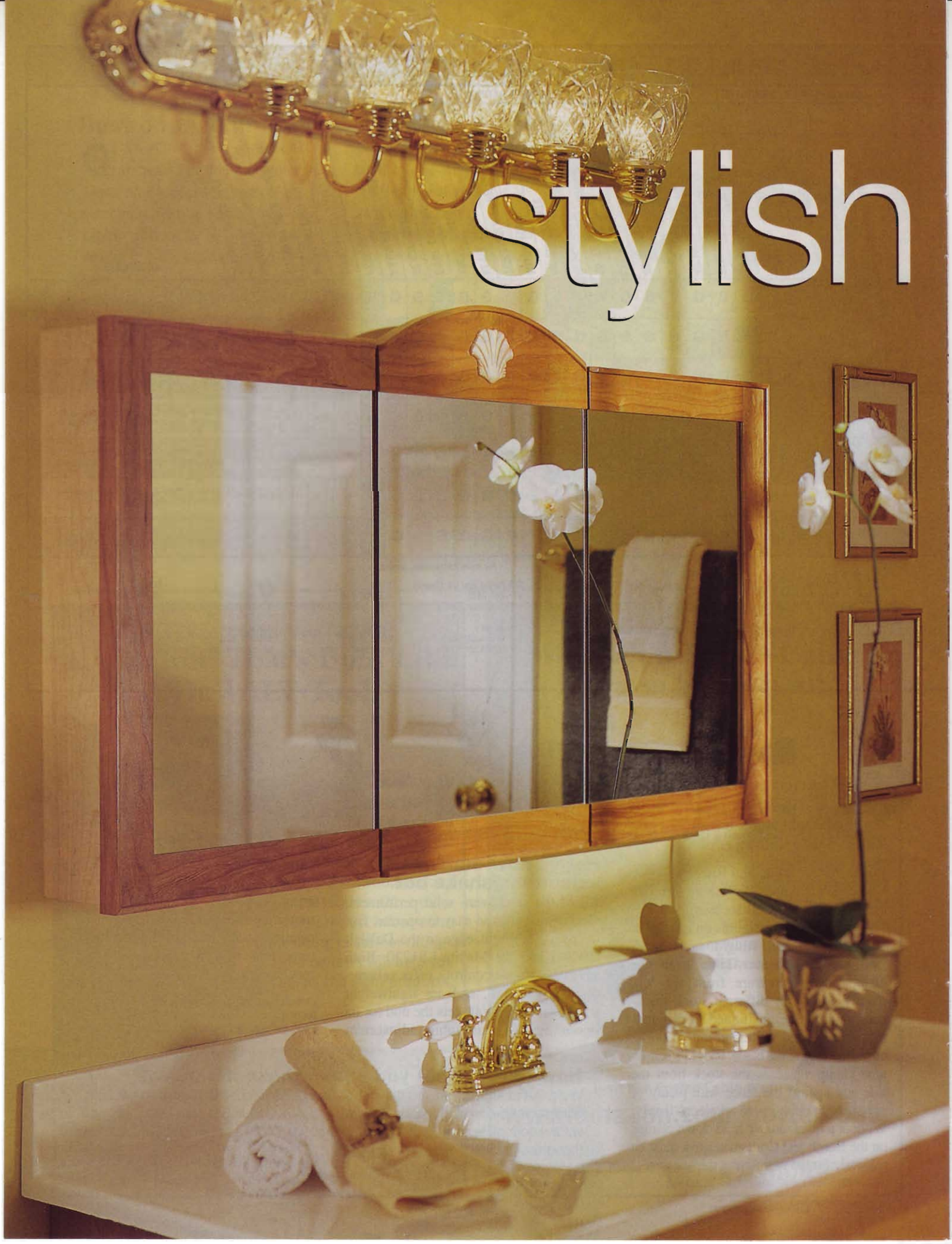
Here's how our selections shake out

All of the saws were solid performers, nicely finished, and easy to operate. But we'll give a slight edge to the DeWalt DW705 and the Makita LS1220. Both have easy-to-use controls, offer velvety-smooth operation, and are lightweight and portable. DeWalt gets the nod for its smooth gliding turntable adjustment with no jerking or two-handed stabilizing required. If you prefer a quiet-operating saw with a genuine soft-start motor, consider the Makita. It's also the smallest and lightest saw in the bunch—important if you need to move the machine around.

Written by **Charles Sommers** and **Dave Campbell**
Technical consultant: **Bob McFarlin**
Photographs: **Baldwin Photography**

Now tell us what you see in these mitersaws

We'd like to know what you think about the saws in our test, so we've set up a 12" Mitersaws discussion group on our WOOD ONLINE® web site. Log on to www.woodonline.com, click on the Interactive Tool Reviews link, and share your thoughts with your fellow woodworkers.


stylish

storage

Make a splash in your bathroom with this three-bay medicine cabinet.

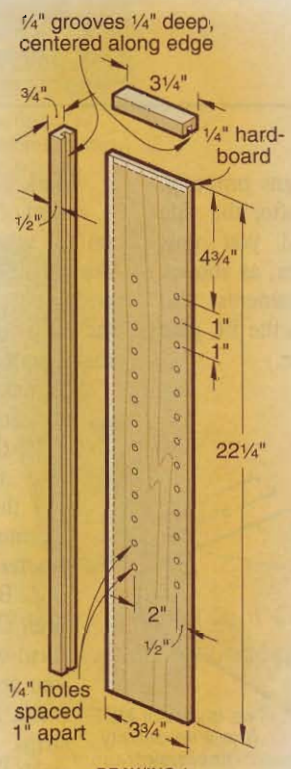
Expand your over-the-sink storage with this pleasing bathroom project. Recessed into the wall, the center bay features holders for a curling iron and a hair dryer. Wire in the outlet inside, and you have a handy place to plug them in. Add to this the two outside mirror-clad doors that open toward the center, giving you convenient three-way viewing.

Note: The center bay of this cabinet fits in the space between wall studs placed 16" on center, and should be centered over your sink. After cutting the opening sized to the center bay in your wall, be sure to toenail in blocking top and bottom to provide support for the cabinet and nailers for the drywall.

Not enough space for the flanking cabinets? Build just the center bay, and use it as shown, or outfit it with adjustable shelves.

Create the carcase first

1 Plane two ¾x8¼x84" maple boards to ½" thick for parts A, B, C, D. Cut the center bay sides (A), center bay ends (B), side bay sides (C), and side bay ends (D) to the sizes in the Bill of Materials.



DRAWING 1
Hole template

2 Install a ¼" dado blade in your tablesaw, and cut the dadoes and rabbets for the corner joints, as shown on the Rabbet and Groove detail on the Side Cabinet drawing. When cutting the rabbets, clamp an auxiliary fence to the rip fence, and position it so the blade just grazes its surface. To avoid chipping on the front edges, run the parts over the dado blade in pairs with their front edges abutting. Mark the front edges. Now form the rabbets for the backs (E) in the rear edges of the sides (A, C), as shown.

3 Make the shelf-support hole drilling template from ¼" hardboard and strips of hardwood, as shown on the Hole Template drawing. Use double-faced tape to secure each side (C), in turn, to the template, and drill the ⅜"-deep holes on your drill press, using a brad-point bit. Keep the tops of the sides against the template's top guide and the fronts of the sides against the template's front guide. The double-sided template allows you to make matching right- and left-hand sides.

4 Glue and clamp the three box frames together, making sure they are square and flat, and let them dry. Cut the backs (E) to size and clamp them to the frames. Drill the pilot and countersunk shank holes, and screw the backs in place, as shown on the Exploded View drawing.

5 Glue and clamp the three boxes together to form the carcase. Keep the tops, bottoms, and the front edges of the boxes flush.

Now make three mating doors

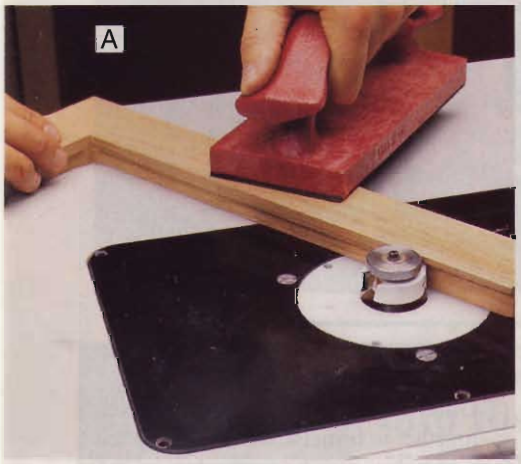
1 Cut the side door stiles (F), side door rails (G), and center door lower rail (H) to the sizes listed. Make a couple extra pieces to test the half-lap setup in the next step. Cut the center door upper rail (I) to the length listed, but make it 4¼" wide. Set the rails (H, I) aside.

2 Install a ¾" dado blade in your tablesaw, and form the half-lap joints in parts F, G, as shown on the Half-Lap detail on the Side Door drawing. Use your rip fence as a stop to control the length of the lap. To eliminate chip-out, back the cuts with an auxiliary fence attached to your miter gauge. Test the setup with the extra pieces before making your final cuts. Glue and clamp the two frames F/G together. Make sure they are square and flat. Set them aside until the glue dries.

3 Install a rabbeting bit in your table-mounted router, and cut the rabbets in the frames F/G, as shown in the Side

Door drawing and *Photo A*. Square the corners with a chisel. Form the same rabbet in the lower center rail (H) and upper center rail (I), as shown in the Center Door drawing.

4 Cut the side door panels (J), center door panel (K), and panel edging (L) to the sizes listed. Install a ⅛" slot cutter (CMT #822.332.11B, or equal) in your table-mounted router. Adjust it so the slot is centered on the thickness of the panels. With the back of the panels (the side facing the inside of the cabinet) down, rout ½"-deep slots in the long edges of all three panels. Then rout slots in the panel edging (L). Do not change your router table setup.

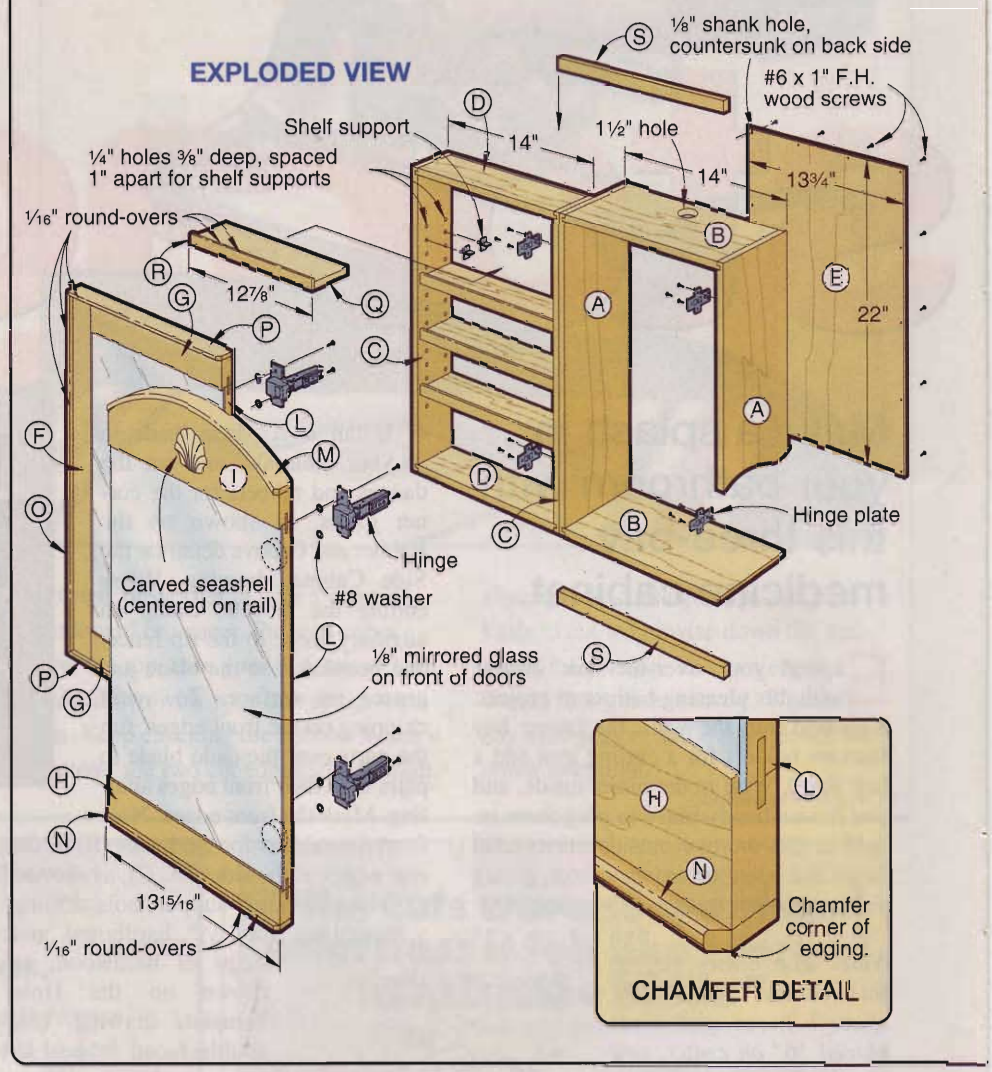


Form the ⅛" rabbets in the three-sided frames F/G by making two passes with the rabbeting bit to reach the full ⅝" width.

5 Cut four ⅛×15⁄16×18¾" hardboard splines. Glue them into the grooves in one edge of each of the side door panels and both edges of the center door panel. Then glue and clamp the panel edging into place, as shown on the Side Door and Center Door drawings. When the glue dries, rout the slots in the panels' top and bottom edges, keeping the backs down.

6 Without changing the router-table setup, and with their backs down, rout slots in the side door frames, and the center lower rail (H) and center upper rail (I). Because the slot cutter pilot bearing rides on the ⅛" lip formed when rabbeting these parts, the slots are ⅜" deep.

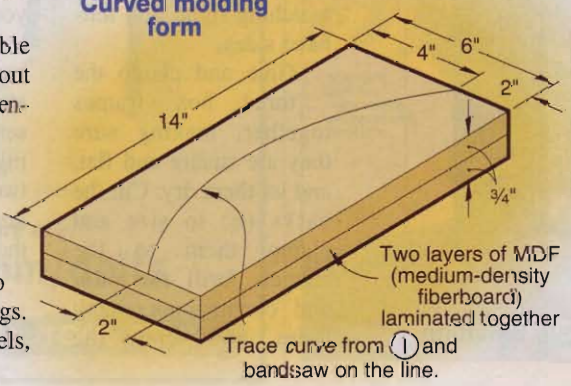
7 Cut 13⁄16"-wide hardboard splines to the lengths shown on the drawings. Dry-fit the door frame parts to the panels, making sure everything aligns properly. Because the slots are cut after the side door frames are assembled, you must round the ends of the splines, as shown. Make any necessary adjustments, and when you are satisfied with the fit, glue and clamp the doors together.



8 Mark the two end points and the midpoint of the curve on the upper center rail (I), where shown on the Center Door drawing. Drive wire brads at these points and bend a thin strip of wood so it contacts all three brads. Mark the curve, then bandsaw and sand to the line.

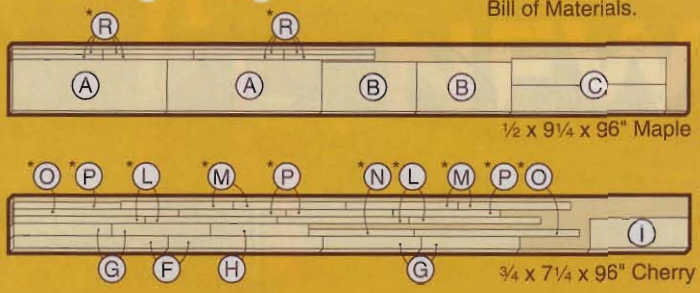
9 To make the curved molding (M) for the center door, glue together two ¾×6×14" pieces of plywood, particleboard, or MDF, and trace the curve you cut in the top center rail (I) onto it, where shown on the Curved Molding Form drawing. Bandsaw the form along the line. Cover the mating edges of the form with plastic packaging tape so you don't glue the lamination to the form. Cut four 1⁄16×1⅛×16" cherry strips. Spread glue on the strips, stack them up and clamp them into the form, as shown in *Photo B*.

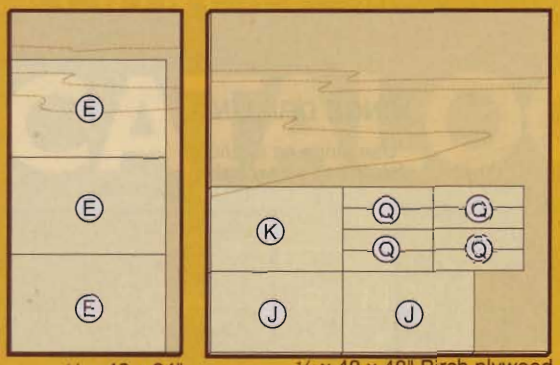
DRAWING 2
Curved molding form

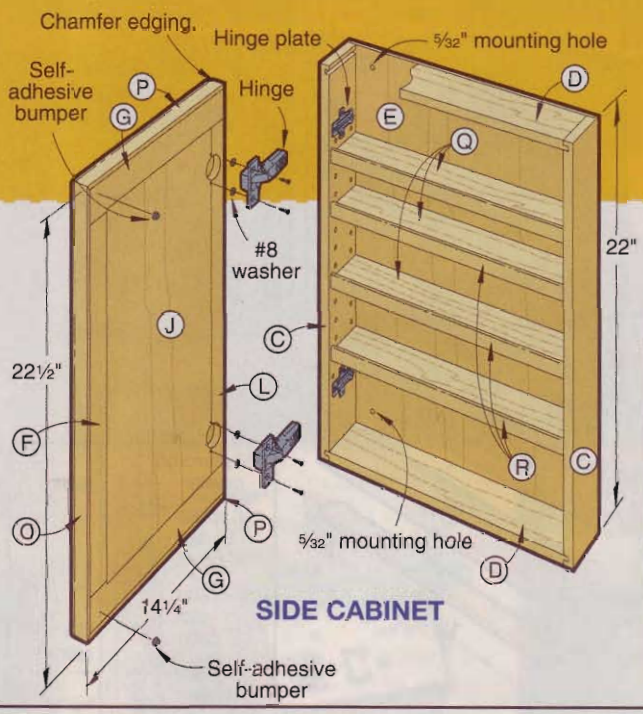


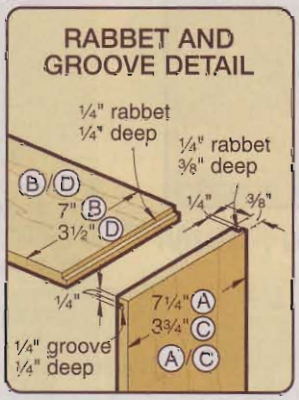
cutting diagram

*Plane or resaw to the thickness listed in the Bill of Materials.









10 When the glue is dry, remove the lamination from the form. Sand the back edge flat, and rip the lamination to finish width. Install a 1⁄16" round-over bit in your table-mounted router, and rout the round-overs on the front edges.

Clamp the strips between the halves of the form with light pressure. Use a narrow block and a mallet to align them, then tighten the clamps.

11 Cut the center door lower molding (N), side doors side moldings (O), and side doors end molding (P) about 1" longer than the sizes listed. Rout 1⁄16" round-overs on the front edges. Trim part N to length, and miter and trim parts O and P to length. Glue and clamp the moldings to the doors. Keep the back edges of the moldings flush with the door panel backs. Use the top half of the curved molding form to apply even pressure when clamping the curved molding in place. After the glue dries, trim the protruding ends of the curved molding with a handsaw, then sand them flush with the sides of the door panel. Sand 45° chamfers on the ends

bill of materials

three-bay mirrored cabinet

Part		FINISHED SIZE T	W	L	Matl	Qty.
A	center bay sides	½"	7¼"	22"	M	2
B	center bay ends	½"	7"	13½"	M	2
C	side bay sides	½"	3¾"	22"	M	4
D	side bay ends	½"	3½"	13½"	M	4
E	backs	¼"	13¾"	22"	BP	3
F	side door stiles	¾"	1¾"	22"	C	2
G	side door rails	¾"	1¾"	14"	C	4
H	center lower rail	¾"	1¾"	13 15⁄16"	C	1
I*	center upper rail	¾"	3 15⁄16"	13 15⁄16"	C	1
J	side door panels	½"	11⅜"	18¾"	BP	2
K	center door panel	½"	11 15⁄16"	18¾"	BP	1
L	panel edging	½"	1"	18¾"	C	4
M*	curved molding	¼"	1"	15"	LC	1
N*	center door lower molding	¼"	1"	13 15⁄16"	C	1
O*	side door side molding	¼"	1"	22½"	C	2
P*	side door end molding	¼"	1"	14¼"	C	4
Q	shelves	½"	3"	12⅞"	BP	8
R	shelf molding	¼"	¾"	12⅞"	M	8
S	wall trim	½"	1"	16"	M	2

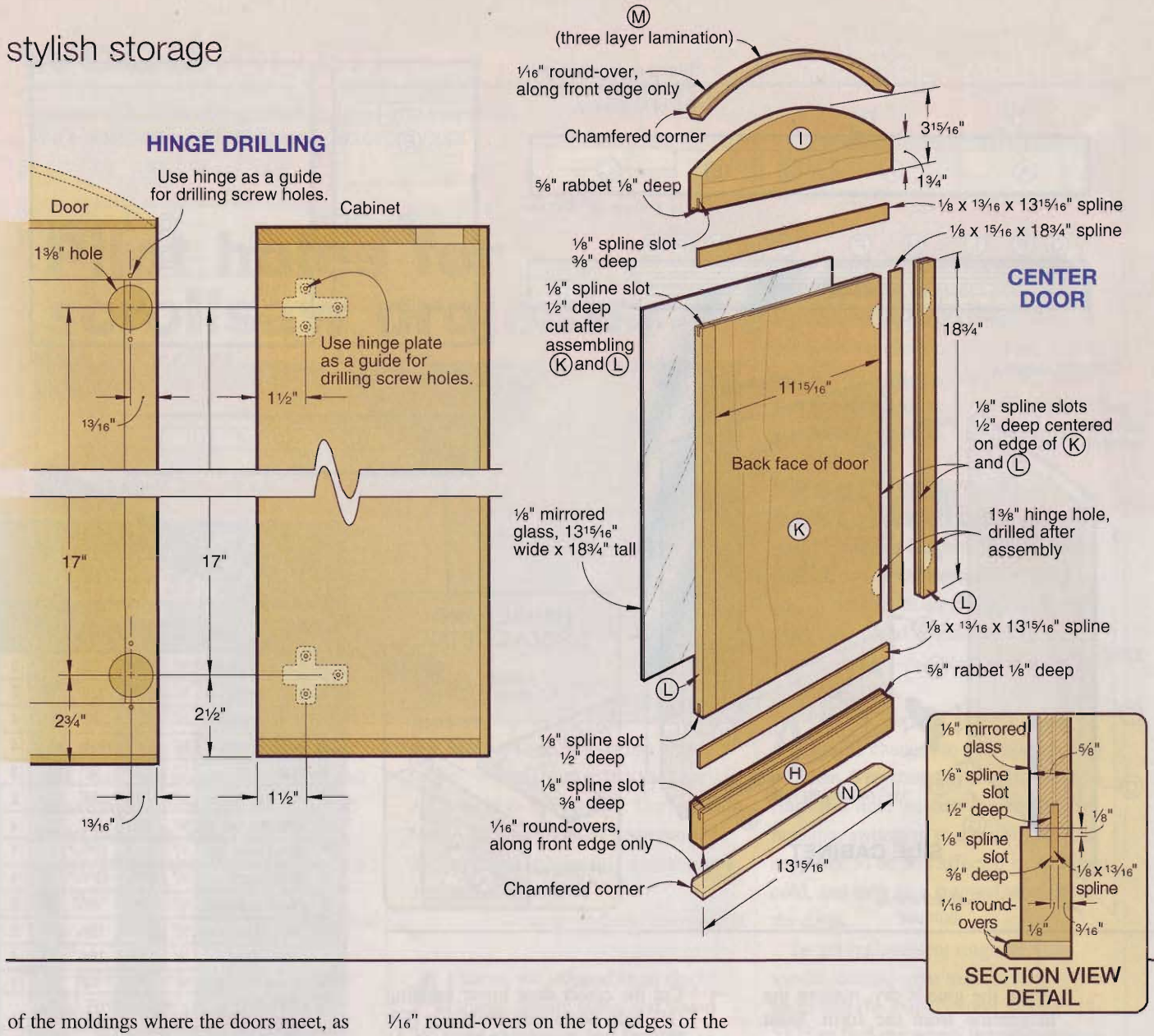
* Parts initially cut oversize.

Materials Key: M–maple, BP–birch plywood, C–cherry, LC–laminated cherry.

Supplies: #6x1" flathead wood screws (42), ⅛" hardboard, #8 flat washers (12), surface-mount electrical box, GFCI outlet and cover plate, finish, ⅛" mirrors (3).

Buying Guide

Hardware: EuroStyle concealed hinges #CH 3700, $3.75 each (6); self-adhesive bumpers #CH462, $1.95 (pack of 100); brass-plated shelf supports #32A12B, $1.70/pack of 12 (3 bags of 12); embossed wood seashell #WC3281, $1.85 each. Add shipping, NY and FL residents add tax. Call Constantine's 800/223-8087, or visit www.constantines.com.



of the moldings where the doors meet, as shown on the Chamfer detail on the Exploded View drawing.

12 Chuck a 1⅜" (35mm) Forstner bit in your drill press, and drill the hinge cup holes in the doors, where shown on the Hinge Drilling drawing. Use your drill-press fence to assure accurate placement. Position the hinges in the cup holes, and using the screw holes in the cup flanges as guides, drill screw pilot holes in the doors. Adhere the hinge mounting plates to the cabinet sides with double-faced tape, where shown. Using the screw holes in the mounting plates as guides, drill screw pilot holes in the sides.

Outfit the interior next

1 Cut the shelves (Q) and the shelf molding (R) to the sizes listed. Rout 1/16" round-overs on the top edges of the shelf molding, as shown on the Exploded View drawing, and glue and clamp the molding to the shelves.

2 We outfitted the interior of the cabinet's center section with an electrical outlet, and holders for two popular bathroom accessories: a hair dryer and a curling iron. The Holders drawing shows how we made them. Be sure to verify the requirements of your equipment, and make any changes.

Now apply a durable, waterproof finish

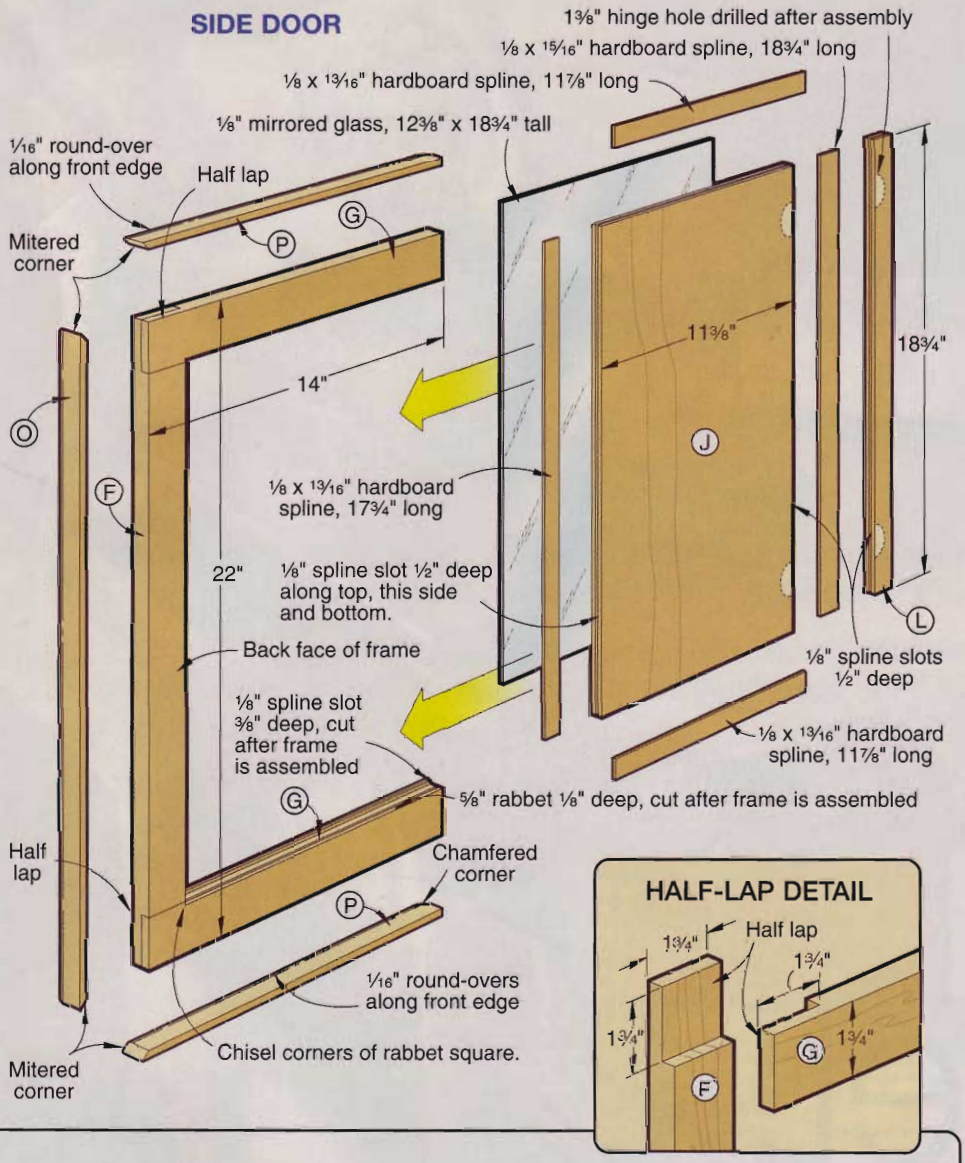
1 Remove the hinges and hinge plates. Finish-sand all the parts and assemblies with 220-grit sandpaper. Glue and clamp the seashell applique to the center door, where shown on the Exploded View drawing.

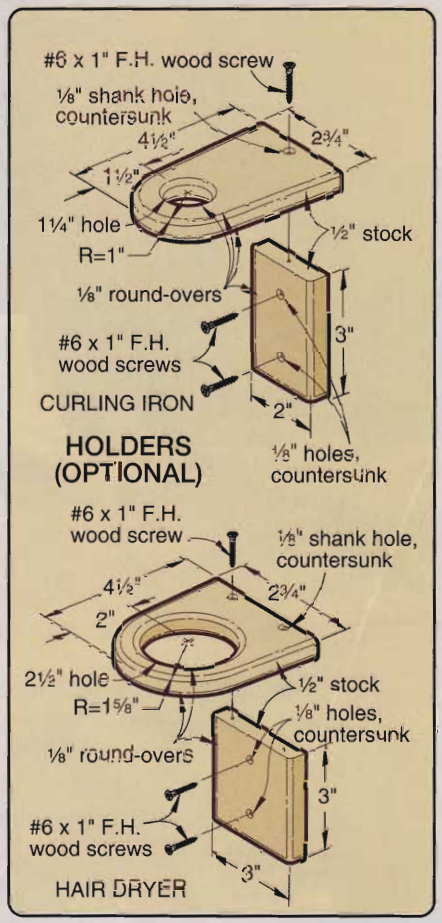
2 Apply two coats of satin polyurethane, sanding with 220-grit sandpaper between coats. Be careful not to let the finish build up behind the lips that hold the mirrors in place.

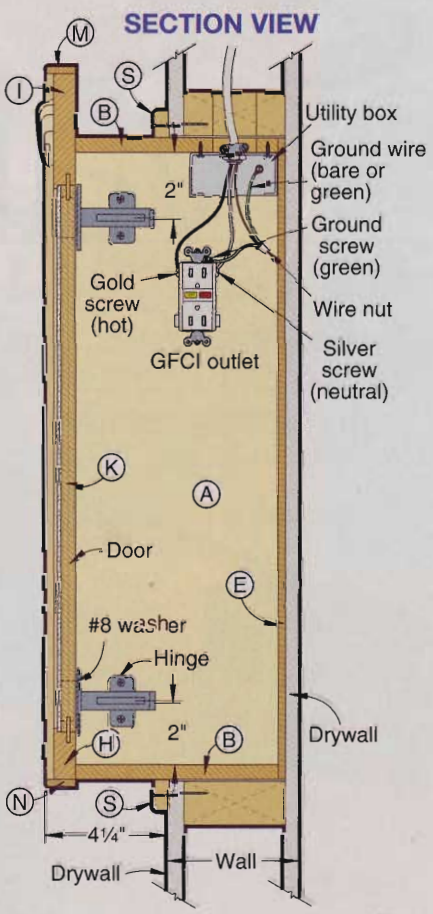
Install the carcase, then do final assembly

1 Have your electrician drill a centered 1½" hole through the upper blocking in the opening that accommodates the cabinet's center bay, and pull a wire to this location. The oversized hole gives you the "wiggle room" you need to slide the cabinet in place.

Note: *The National Electrical Code (NEC) requires a 20-amp circuit and-ground fault circuit interrupter (GFCI) protection for this outlet. The method of*







connection depends on how your bathroom is wired. Check with your local code authority.

2 Drill a mating hole in the top of the cabinet. Tip the top of the center bay into the wall opening, and pull the wire through. Seat the cabinet in the wall, as shown on the Section View drawing. Level it, and screw through the backs of the side bays into the wall framing that flanks the center bay. Paint the wall trim (S) the same color as your walls, and nail it in place, where shown.

3 Mount a surface box over the hole, pulling the wire into the box. Wire and mount a GFCI outlet, and install the cover plate. Drill pilot holes and mount the equipment holders.

4 Screw the hinge-mounting plates to the cabinets and the hinges to the doors. Because nominal ½" plywood is less than ½" thick, and the hinges require a ½"-deep cup hole, place #8 flat washers under the hinge flanges when screwing them in place. Snap the hinges onto the mounting plates, and use the hinges' adjustment screws to align the doors. Adhere self-adhesive bumpers.

5 Measure your doors for mirrors. Order the mirrors cut to your exact measurements, then have the edges ground smooth. The grinding removes just enough material so the mirrors slide into their frames. Install the mirrors.

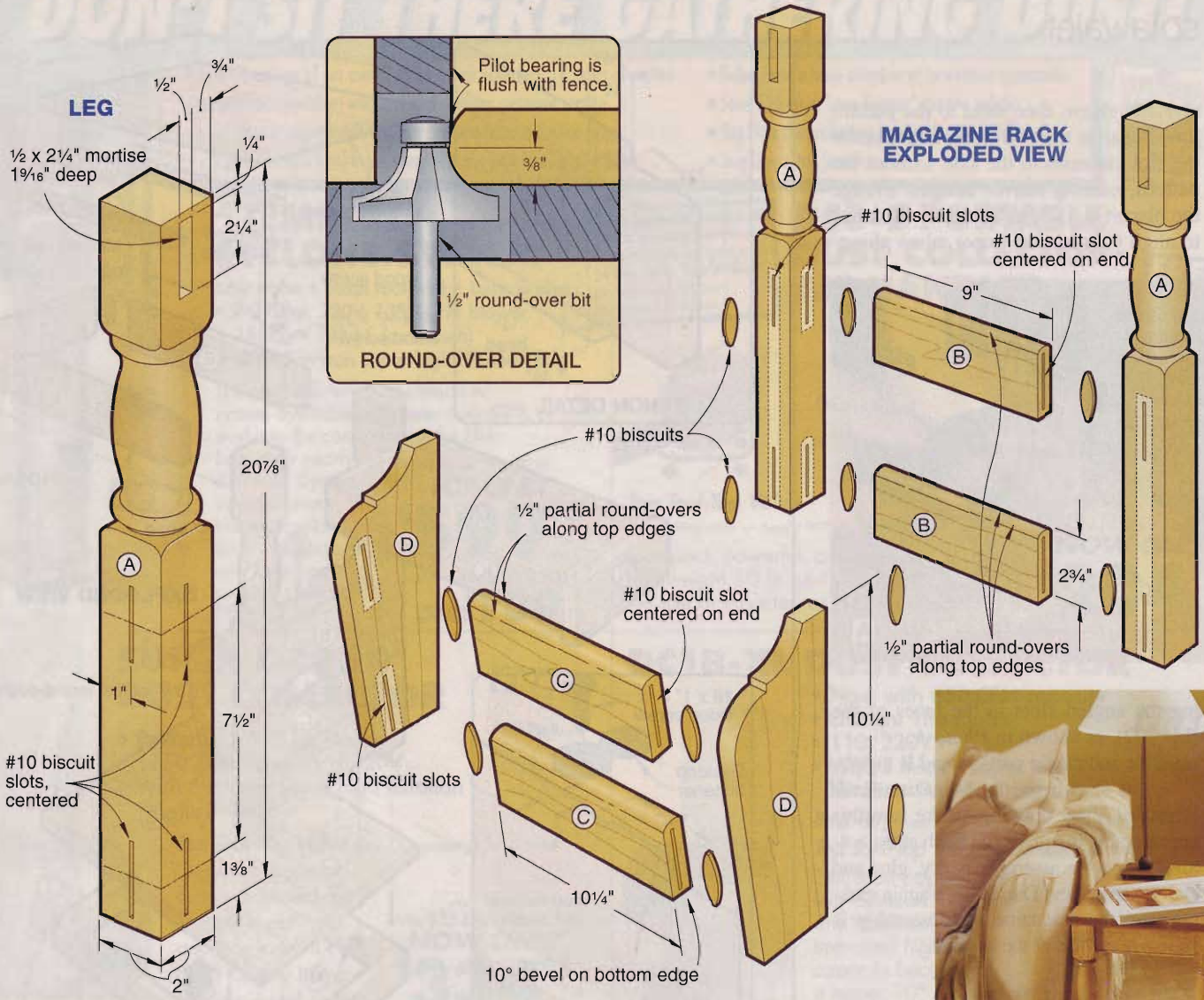
6 Insert the shelf rests and the shelves. Energize the outlet circuit, and stock the cabinet.

Written by **Jan Hale Svec** with **Kevin Boyle**
Project Design: **James R. Downing**
Illustrations: **Kim Downing**; **Lorna Johnson**
Photography: **Baldwin Photography**; **Wm. Hopkins**

sofa valet:

It's designed to serve

keep magazines, the TV remote, or snacks and beverages within easy reach



This table has a dual personality. Parked beside your sofa, as shown *right*, its concealed casters let it masquerade as an end table with a magazine rack. Wheel it around front, cantilever it over the cushions, and it becomes a center for snacks with a drawer for coasters and the TV remote.

For those of you who are interested in building this project, but don't want to turn the legs, you can buy a pre-turned pair. See the Buying Guide. If you feel up to the challenge, but need a little help, see the turning instructions on *page 84*. Adept turners, go directly to the full-size pattern on the *WOOD PATTERNS®* insert. No matter which way you choose, once you have your legs in hand, you're ready to proceed.

Mortises and biscuit slots complete the legs

1 Form the mortises at the top of each leg, where shown on the Leg drawing. To do this, chuck a ½" brad-point bit in your drill press, and position the fence to center the bit on the leg. Drill a row of overlapping holes to the required depth. Clean up the edges and square the ends with a chisel.

2 Lay out and plunge the biscuit slots, where shown on the drawing. Be sure to locate the slots to form mirror-image legs.

Build the magazine rack and leg assembly

1 Cut the front stretchers (B) and the back stretchers (C) to the sizes listed. Chuck a ½" round-over bit in your table-mounted router, and rout the partial round-overs, as shown in the Round-over detail on the Magazine Rack Exploded View drawing.

2 Form biscuit slots in the ends of the stretchers, centered in the width and thickness. Bevel-rip the bottom edge of the lower back stretcher (C).

3 Cut two blanks for the sides (D) to the size listed, and stick them together with double-faced tape. Make a copy of the Side from the pattern insert, and adhere it to the blanks with spray adhe-

sive. Bandsaw, then sand to the pattern line. Separate the two sides, and transfer the slot locations to the side without the pattern, making mirror images. Plunge the biscuit slots. Use a scrapwood fence to align your biscuit joiner when plung-

Clamp a scrapwood fence to the sides (D), parallel to the angled slot locations.

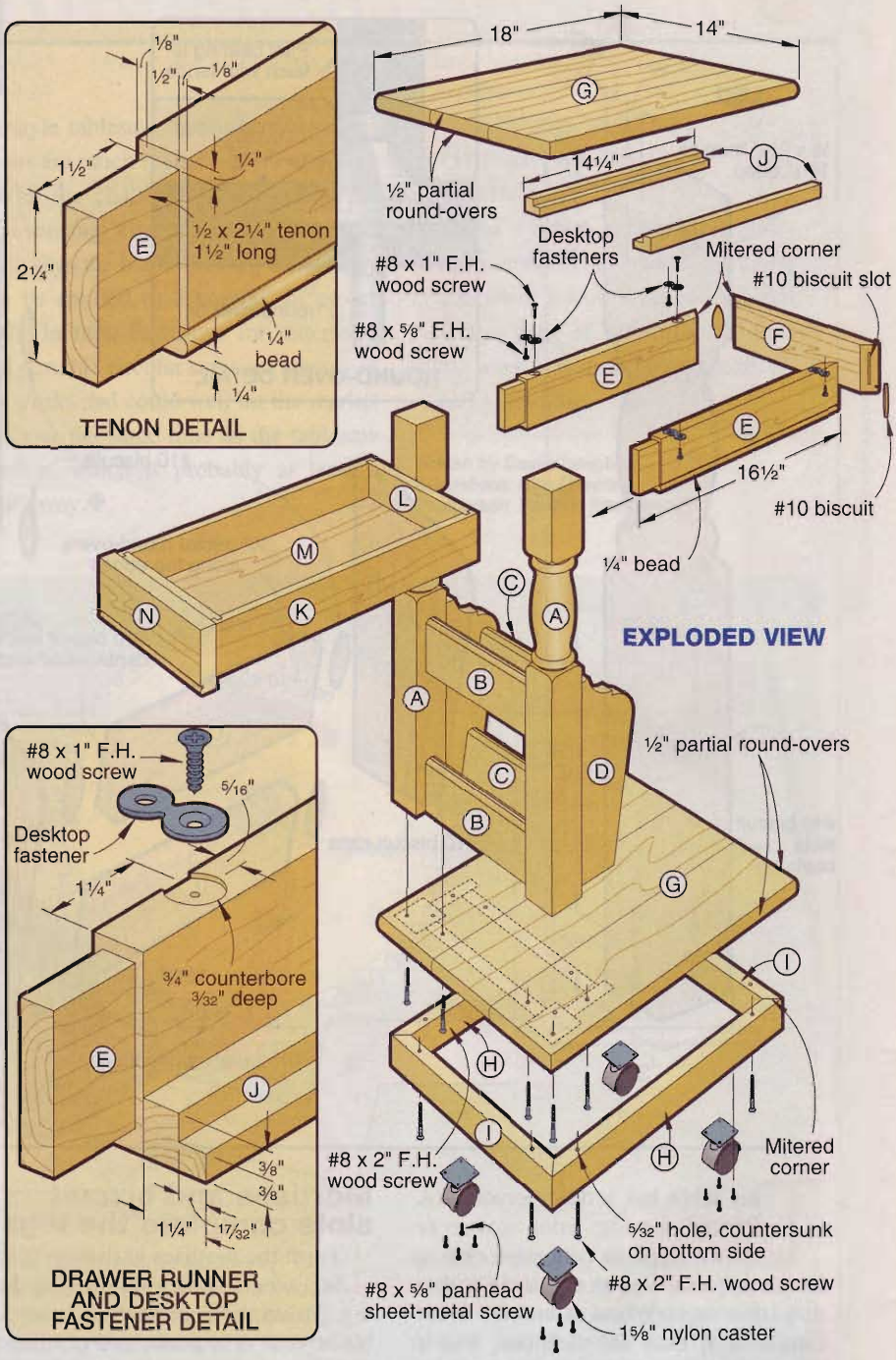
ing the angled slots in the faces of the sides (D), as shown in *Photo A*.

4 Glue and clamp parts A and B together, as shown on the Magazine Rack Exploded View drawing. Make sure this leg assembly is square and flush at the bottom. When the assembly is dry, glue and clamp parts C and D to it, once again making sure the magazine rack assembly is square and flush at the bottom.

Assemble the upper skirts

1 Cut the upper side skirts (E) and the upper end skirt (F) to the sizes listed, mitering one end of the side skirts and both ends of the end skirt. Set the end skirt (F) aside. Install a ¾" dado blade in your tablesaw, and position the rip fence 1½" from the left edge of the blade. Backing the pieces with your miter gauge, and using the fence as a stop, form the tenons, as shown in the Tenon detail on the Exploded View drawing. Start with shallow cuts and sneak up on the finish size, testing the fit of the tenons in the leg mortises as you go.

2 Chuck a ¼" beading bit in your table-mounted router, and position the fence so the bead nose is flush with the face of the fence. Form beads on the bottom edges of the upper skirts (E, F), where shown on the Exploded View drawing. Make sure the upper side skirts (E) are mirror images.



3 Drill mortises for desktop fasteners in the edges of the skirts (E), where shown in the Drawer Runner and Desktop Fastener detail on the Exploded View drawing. See the Buying Guide for our desktop fastener source.

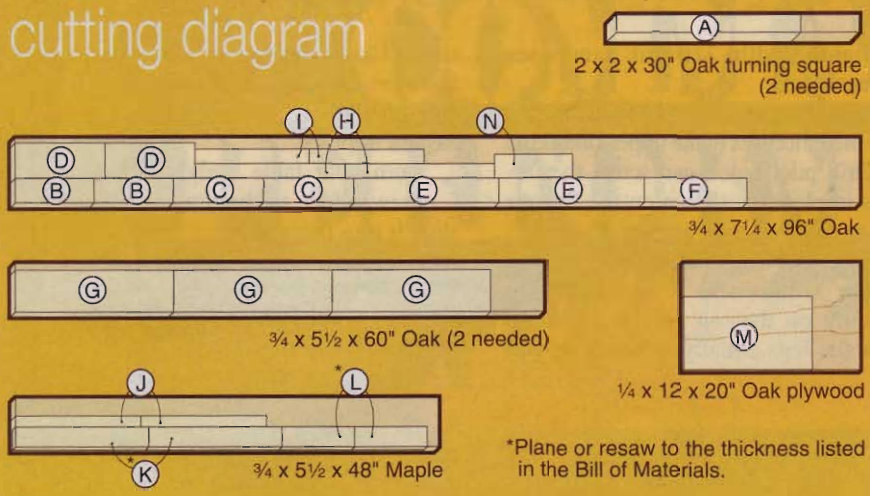
4 Plunge mating biscuit slots in the mitered corners of the upper skirts. Spread glue in the leg mortises and insert the upper side skirts (E). Apply glue to the mitered corners and in the biscuit slots, insert the biscuits, and pop the upper end skirt (F) in place. Clamp the assembly, and check for square.

Now add a base and top

1 Edge-glue two ¾×15×19" panels for the top/base (G). After the glue dries, trim them to the size listed, and rout the same partial round-over shown in the Round-over detail on the Magazine Rack Exploded View drawing.

2 Clamp the leg assembly A/B/C/D/E/F to the base panel (G), where

cutting diagram



*Plane or resaw to the thickness listed in the Bill of Materials.

bill of materials

sofa valet

Part	FINISHED SIZE T	W	L	Matl.	Qty.
A legs	2"	2"	20⅞"	O	2
B front stretchers	¾"	2¾"	9"	O	2
C back stretchers	¾"	2¾"	10¼"	O	2
D* rack sides	¾"	4¼"	10¼"	O	2
E upper side skirts	¾"	2¾"	16½"	O	2
F upper end skirt	¾"	2¾"	11¾"	O	1
G* top/base	¾"	14"	18"	EO	2
H lower side skirts	¾"	1⅝"	17"	O	2
I lower end skirts	¾"	1⅝"	13"	O	2
J drawer runners	¾"	1¼"	14¼"	M	2
K* drawer sides	½"	2¼"	15⅛"	M	2
L* drawer ends	½"	2¼"	8¼"	M	2
M drawer bottom	¼"	8¼"	14⅝"	OP	1
N drawer front	¾"	2⅝"	8⅞"	O	1

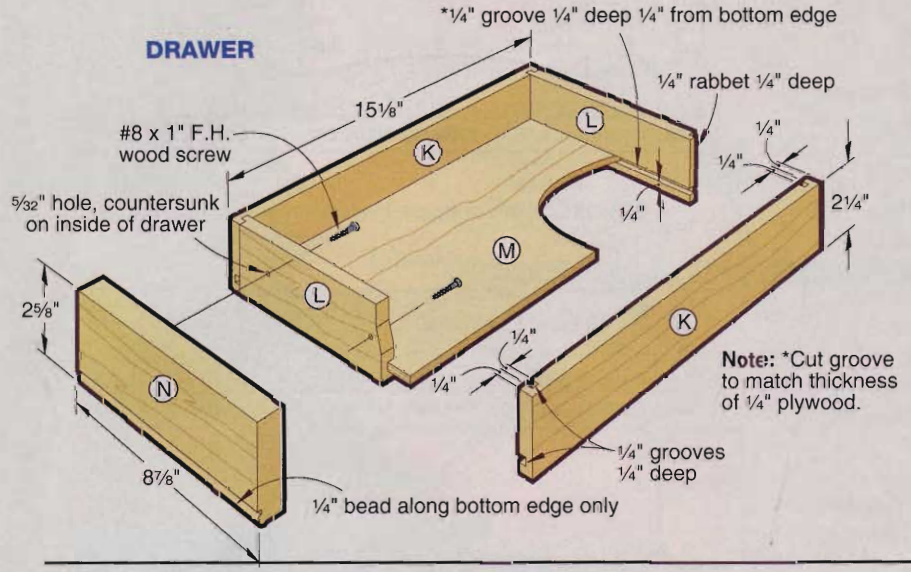
*Parts initially cut oversized. Trim to finished size according to instructions.

Materials Key: O–oak, EO–edge-glued oak, M–maple, OP–oak plywood.

Supplies: #10 biscuits (14), #8x2" flathead wood screws (20), #8x1" flathead wood screws (6), #8x⅝" flathead wood screws (4), #8x⅝" pan-head sheet-metal screws (16), glue, stain, finish.

Buying Guide: **Legs:** Two pre-turned oak legs are available. Order WOOD KIT SF-1, $48.95 ppd., Schlabaugh and Sons Woodworking, 720 14th Street, Kalona, IA 52247, or call 800/346-9663. Other wood species available upon request.

Desktop fasteners, casters: Desktop fasteners no. 866-826, $5.20/pack of 10, black nylon twin-wheel plate caster no. 868-094, order four @ $1.95 each. Add shipping; NM, WY, NC residents add tax. Call Woodworker's Supply, 800/645-9292.



shown on the Base drawing on the pattern insert, and drill screw pilot and shank holes through the base and into the leg assembly. Screw the base to the leg assembly.

3 Cut the lower side skirts (H) and lower end skirts (I) to the sizes listed, and miter the ends. Glue and clamp the lower skirts together to form a frame. Check to make certain it is square and flat. If you use different casters than we did, size your lower skirts to leave ⅜" clearance between the floor and the bottom of the skirts. See the Buying Guide for our caster source.

4 Locate the lower skirt frame and the casters on the base (G), where shown on the Base drawing. Drill screw pilot and shank holes through the skirt frame into the base, and screw pilot holes for the casters. Screw the lower skirt frame and the casters to the base, as shown on the Exploded View drawing. If you use different casters, mount them so there is swivel clearance between the casters and the lower skirt frame.

A drawer completes the construction

1 Cut two drawer runners (J) to the size listed. With a dado blade housed in an auxiliary fence attached to your tablesaw rip fence, plow rabbets in the runners, as shown in the Drawer Runner and Desktop Fastener detail on the Exploded View drawing. Glue and clamp the runners to the upper side skirts (E), where shown in the detail.

2 Plane a ¾x2½x48" piece of maple to ½" thick for the drawer sides (K) and drawer ends (L). Cut the parts to the sizes listed. Install a ¼" dado blade in your tablesaw. Plow the dadoes for the drawer ends, and the rabbets that form the tenons in the drawer sides. Make two passes with a single blade from your dado set to make grooves that match the thickness of the drawer bottom in the sides and ends, as shown on the Drawer drawing.

3 Dry-assemble the drawer sides and ends, check the measurements, and cut the plywood drawer bottom (M) to size. Glue and clamp the drawer together. Make certain the drawer is square and flat. Set it aside.

4 Cut the drawer front (N) to the size listed, then, as with the upper skirts (E, F), rout a bead along the bottom edge. Clamp the drawer front to the drawer box with the tops flush and the front protruding equally at the sides. Drill screw pilot and shank holes through the drawer end (L) into the drawer front (N), as shown on the Drawer drawing.

Apply a finish and assemble the parts

1 Remove the drawer front from the drawer box and the casters from the base. Finish-sand all the parts and assemblies to 220 grit.

2 If desired, apply a coat of stain. (We used Minwax Golden Oak 210B.) Apply two coats of polyurethane, sanding lightly with 220-grit sandpaper between coats.

3 Place the desktop fasteners in the drilled mortises in the upper side skirts (E). Drill pilot holes, and screw the fasteners in place, as shown on the Drawer Runner and Desktop Fastener detail.

4 Place the top, bottom side up, on your workbench. Position the leg assembly on the top so the top overhangs the legs equally at the front and sides. Using the holes in the desktop fasteners as guides, drill pilot holes into the top. Drive the screws. Screw the casters in place.

5 Turn your table upright, screw the drawer face to the drawer box, and slide it into place.

Written by **Jan Hale Svec** with **Kevin Boyle**
Design: **James E. Boelling**
Illustrations: **Kim Downing; Lorna Johnson**
Photographs: **Baldwin Photography; Wm. Hopkins**

Turning the legs

1 Copy the Leg Template from the pattern insert, and adhere it to a ⅛×1½×6⅞" piece of hardboard. Saw, then sand to the pattern line, leaving the negative image of the leg profile to use in checking the progress of your turning. Trim two, 2" turning squares for the legs (A) to the length listed in the Bill of Materials, squaring the ends. Mark centers on the ends.

2 Mount the first blank between the lathe centers. With a pencil, mark the locations of the square-to-round transitions, where indicated on the Template and the Leg drawing on the pattern insert. Ease your ¾" skew chisel into the spinning blank, forming rounded V-grooves. Cutting in from both sides gives you the tool clearance necessary to form the groove to the required depth. Stop the lathe periodically to check the depth with your calipers.

3 Use your 1" roughing gouge to turn the portion of the blank between the transitions to form a cylinder. First round the two ends of the center portion, taking care not to cut into the transitions. Then round the rest of the section. Because the largest center diameter is 1⅞", take off just enough material to make it round.

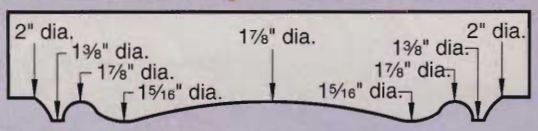
4 With a pencil, mark the locations of the critical diameters and beads on the blank, where indicated on the pattern. Form the narrow flats at the bottoms of the transitions with your parting tool. Cut slots in the blank to the appropriate depths, where indicated by your pencil marks. Work the beads from their centers to their sides. Roll the parting tool over to follow the bead profile as you cut downhill.

5 Form the broad profile with your ⅜" spindle gouge. As you approach the final shape, make very light cuts, and move in long, continuous motions. Work the profiles downhill (from the large diameter to the small diameter). As you approach the beads, roll your gouge away from them.

6 Slow the lathe to 800–1,200 rpm, and finish-sand the turning with a progression of 120-220-320-grit sandpaper. To obtain the best finish with the least amount of effort, don't skip grits.

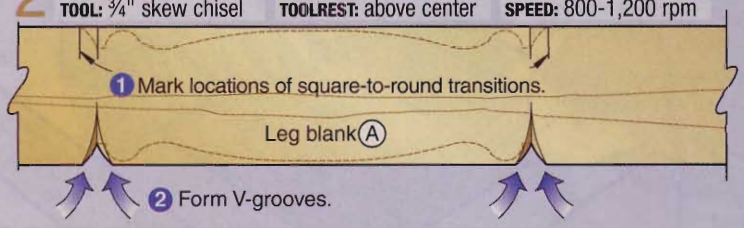
Remove the completed leg from the lathe, mount and mark the second blank, and repeat the turning steps.

1 Make the template



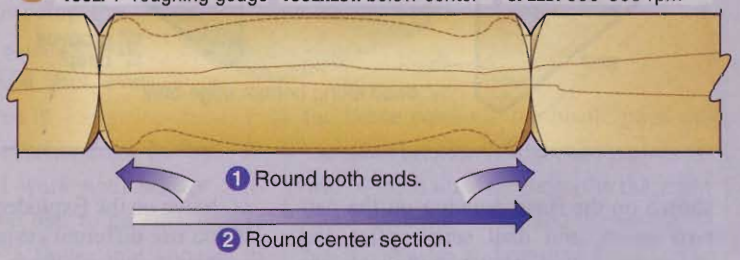
2 Prepare blank, form transitions

TOOL: ¾" skew chisel **TOOLREST:** above center **SPEED:** 800-1,200 rpm



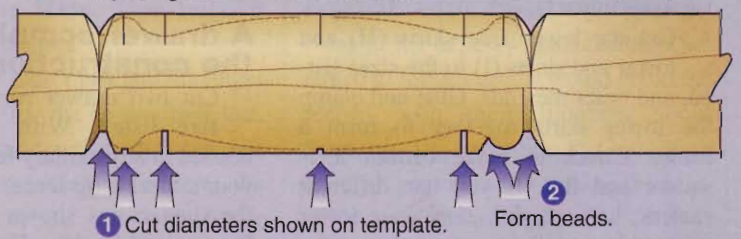
3 Rough-turn the center

TOOL: 1" roughing gouge **TOOLREST:** below center **SPEED:** 600-800 rpm



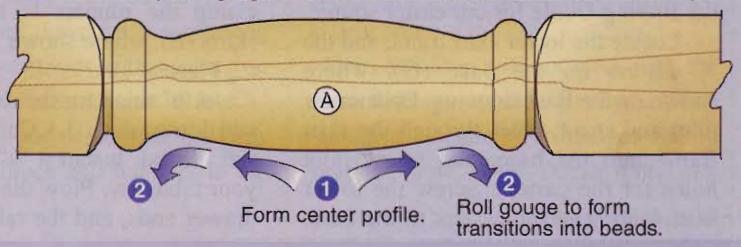
4 Set diameters, form beads

TOOL: parting tool **TOOLREST:** center **SPEED:** 800-1,200 rpm



5 Finishing up

TOOL: ⅜" spindle gouge **TOOLREST:** below center **SPEED:** 1,200-1,600 rpm



RTX-2 steps on rotary-tool turf

For years, Dremel has had such a lock on the rotary tool market that "Dremel-tool" has become to "rotary tool" what "Kleenex" is to "facial tissue." Now, Black & Decker is out to cut through that lock in record time with its RTX line of rotary tools.

The RTX boasts 2 amps of power, compared to the Dremel Professional's 1.15 amps, and that extra power was apparent. Using a reinforced cutting wheel, I used the RTX to cut several notches in ¼" cold-rolled steel plate. The motor didn't bog down at all.

Black & Decker offers two different versions of the tool. The RTX-1 comes with a wide variety of hobby and DIY-oriented accessories, while the RTX-2 is geared more toward woodworkers. The latter kit includes an easy-to-attach flexible shaft and fewer bits. Those bits, though, are more focused on sanding,, carving, and cutting chores.

For changing bits, flipping a single lever locks the collet while simultaneously blocking the power switch from accidental activation. That's important because the power switch is right there on the neck of the RTX-2. I like that location because I can turn on the tool without letting go of my workpiece. The 8,000–30,000 rpm variable-speed control is separate and on the back end of the tool.

Like all tools of its ilk, the RTX-2 is noisy (at 90 decibels, it drowned out my shop vacuum), so you'll definitely want hearing protection if you'll use it for any length of time. I also noticed that my hand blocked some of the

tool's cooling vents when held in pencil-grip fashion—a factor that might ultimately shorten the motor's life.

—Tested by Garry Smith

PRODUCT SCORECARD

Black & Decker RTX-2

Performance	★★★★½
Price	$69, RTX-2; $59, RTX-1
Value	★★★★★

Call Black & Decker at 800/544-6986, or visit www.blackanddecker.com.

Work 'N Woody
follows the outlaws

Work 'N Woody goes to work pushing cars at the World of Outlaws Nationals races in Knoxville, Iowa.

Roaring engines, flying dirt, the smells of exhaust and hot rubber—they're all part of the sprint car race series called the World of Outlaws. But so is the toy-like, wood-bodied vehicle named Work 'N Woody.

For nine months a year, Carol and Art Malies take their ash-bodied Work 'N Woody on the World of Outlaws trail.

The official push truck and safety vehicle of the World of Outlaws, Work 'N Woody belongs to Art and Carol Malies of Carmichael, California. They tow the vehicle 40,000 miles a year to about 100 races on a trailer behind their motor home. At the evening races, Work 'N Woody puts in seven hours pushing an average of 30 cars and supporting track officials and safety crews. For such duties, the vehicle has a spring-loaded front push bar (sprint cars don't have starters), a 1,500-pound winch for tire changes, and a lift boom for engine changing.

Work 'N Woody was created in 1980 from a 1957 FC Willys Jeep chassis. It's power comes from a 388-cubic-inch Chevrolet V-8. It's the body, though, that catches attention. Art made it from ¼"-thick ash plywood panels bolted to a channel-iron body frame. The ash is covered by fiberglass, then coated with a DuPont automotive clear finish. According to Art, the panels have to be replaced about every two years at a cost of $1,200.

Intarsia honors the year 2000's cadets

At the United States Military Academy at West Point, each year's graduating class must design a distinctive crest to place on their class rings. When Cadet Michael Panaro of Pittsgrove, New Jersey, graduated last June, he got more than the traditional crested ring.

His grandfather, Dave Panaro, at age 72 still an avid woodworker, made an intarsia picture of the year 2000's class crest as a graduation gift. The crafted crest, *right*, made from 146 pieces of ¾"-thick yellow poplar, measured 13½×13¾", and took Dave about 80 hours of cutting, sanding, fitting, and painting. Michael, now a second lieutenant, plans to take the treasured intarsia wherever the Army sends him.

The subject of this intarsia piece is the crest of the year 2000 West Point graduating class.

Photographs: Michael Panaro, Sr.; Hetherington Photography

New York state leads the way in forest certification

Last year, the Empire State became the first state in the nation to receive "well-managed" certification for all of its public forest lands. More than 700,000 acres got the environmentally friendly endorsement from the National Wildlife Federation and SmartWood. Forests cover 62 percent of New York and support a $2 billion forest products industry that employs 65,000 people.